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Contents

NOTICES:—All communications relating to editorial matter should be addressed to the Editor, who will be pleased to consider articles or contributions dealing with modern chemical developments or suggestions bearing upon the advancement of the chemical industry in this country. Communications relating to advertisements or general matters should be addressed to the Manager.

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The Calcium Carbide Decision

THE decision of the official referee, in the inquiry whether calcium carbide has been properly excluded from the Board of Trade's list of dutiable articles under Part I. of the Safeguarding Act, has gone against the complainants and in favour of the Board of Trade. Mr. Atkinson is not merely unconvinced that it has been improperly excluded; he is positively convinced that it has been properly excluded. A date is reserved for the discussion of any points of law arising out of this preliminary finding, but it is not known yet whether the complainants, who must already have incurred heavy costs, will proceed with the case further. The terms of the judgment illustrate the detached spirit in which the legal mind threads its way through the maze of technical evidence. The experts, eminent chemists on both sides, are so evenly divided on the question whether calcium carbide is or is not an organic chemical that they cancel one another out—a painfully negative result from so much learning. If the text books had been balanced in the same inconclusive way, one can only speculate what the embarrassed referee would have done. They, however, convinced him on two points: that there is not a meaning of the words "organic chemical" generally accepted by chemists, and that 90 per cent. of the text book writers include, or deal with, calcium carbide in the inorganic branch. After this, his decision was almost a matter of course.

Before this decision was announced another inquiry had been begun before the referee into a complaint that tartaric acid, cream of tartar, and citric acid have been wrongly included in the Board of Trade list. For "certain reasons," the names of the complainants were not disclosed, but they were stated to be British firms, and associated with them are bodies representing manufacturing confectioners and mineral water makers. The opponents include Campbell, Bishop, & Co., Ltd., the Phœnix Chemical Co., Ltd., and Howards & Sons. This part of the Act runs for five years, and at the present rate of progress the inquiries promise to extend over a considerable part of that period.

Pulverised Coal Systems

THE revised edition of Leonard C. Harvey's valuable report on "Pulverised Coal Systems in America" (H. M. Stationery Office, pp. 117, post free 5s. 3½d.) is in form substantially the same as the original publication. The information originally published, however, has been revised, alterations made where necessary, and important additional data and records included. The author, in reviewing the progress made in England and other countries, attributes it to the pioneer work carried out in America and to the various systems developed there. He regards it as a natural consequence of the initial advance made in America that the greatest progress since the writing of the original report should still be found in America. Mr. Harvey accepts this as reassuring, for it proves that the economies to be obtained by burning fuel in pulverised form have been further established by these extended applications.

The most notable advance has been in the direction of burning pulverised fuel under boilers, and for large power stations it is beginning to supplant mechanical stokers. The high cost of imported coal in Europe is expected to increase the use of pulverised fuel. Several large installations have already been made or are now on order for iron and steel works, and in the near future a great development is expected in the field of locomotive applications in Europe and foreign countries. Locomotive engineers from the west of America, where up to now oil has been the fuel almost exclusively employed, have been forced, by the scarcity

of liquid fuel at a reasonable cost, to inspect pulverised coal equipment in use with a view to the conversion of oil-fired locomotives to pulverised lignite and like fuel firing. Little further progress is to be reported as to the use of pulverised coal in ships, but the question of using pulverised coal and oil in combination as a "colloidal" oil is receiving support. Improvements have been effected in treating ash troubles and in methods of conveying pulverised coal, and progress has been made in the use of pulverised coal for firing rotary kilns for calcining and burning lime and fertiliser materials, very much as is done in cement works practice. For some time experiments have been proceeding in America in the fixation of gas from pulverised coal, and several references are made to new types of plant devised for coking pulverised coal, the extraction of the light hydrocarbons, oil and gas, and the ultimate use of the by-product coke in pulverised form. Some notes are added by the author on the Trent and Benner systems. On behalf of the Indian Government Railway Board Mr. W. A. C. Thorpe has completed an investigation in America on the subject of pulverised coal as a fuel for locomotives and his work should add materially to the available knowledge on the subject.

In a prefatory note Sir George Beilby points out that one effect of recent developments in the coal industry will be to emphasise more than ever the need for the adoption of more economical and efficient means for the use of fuel in industry. "The bare fact," he writes, "that the pulverising method is now being applied to the burning of between ten and fifteen million tons of coal per annum in America is in itself strong reason for its serious consideration in Great Britain. It is hoped that this consideration will not stop short of a close study of the possibilities which it may present of increased efficiency in the use of fuel in many British industries. The advantages of the method as an almost perfect means of burning coal must be weighed against the cost of producing and handling coal-dust and the difficulties which may have to be overcome in dealing with its ash. These two sides of the technical and economic problem have been fully discussed with Mr. Harvey from time to time, and the whole subject has been critically examined from this point of view. It appears to the Board that the publication of the revised report will enable the larger consumers of fuel to make a fairly complete preliminary study of the whole question and to decide whether, for their own particular requirements, a case can be made out for a closer and more exhaustive inquiry into its possibilities."

Decomposition of Benzene

In the pyrogenetic decomposition of carbon and hydrogen compounds there still remains a considerable amount of research to be carried out before anything approaching definite conclusions can be come to. The variable and complicated conditions under which primary and secondary reactions occur have rendered the work of the investigator extremely difficult, so that one naturally looks for the expression of a number of contradictory opinions. In his classic researches, extending from 1863 to 1869, the famous Berthelot showed that the ultimate resolution of a hydrocarbon into its elements must in no way be regarded as the immediate result of a single change, but that gradual breaking-down into molecules containing a smaller number of atoms takes place. In 1894 Lewes followed up the work and found himself in partial agreement with Berthelot, but it was Bone who, in 1908, propounded an entirely new theory, which was based on the fact that carbonaceous residues, such as CH and CH_2 are capable of an extremely fugitive existence before recombination. Bone, in fact, was of the opinion that the mode of decomposition of any particular hydrocarbon could not (with the exception of methane, the degradation of which is in the main a direct disunion into carbon and hydrogen) be expressed by a single chemical equation.

Within the last few years research of an important character with some of the more common hydrocarbons has been carried out at Leeds University by Cobb and his co-workers. Cobb has given particular attention to benzene and toluene, and interest is lent to his work by a separate set of experiments which were conducted last year in America by Zanetti and Kandell. The two last-named investigators have so far been mainly concerned with the formation of anthracene from benzene and ethylene. Cobb in 1918 endeavoured to determine how benzene and its homologues decompose under the action of heat, and he found that at 550°C. diphenyl was yielded, the quantity increasing as the temperature was carried higher. With a continued rise in temperature, however, decomposition went a stage further, diphenyl-benzene being formed. Particular attention was drawn to the influence of atmosphere, and it was pointed out that the action of hydrogen on the attached groups of more complicated ring compounds most probably accounts for the production of naphthalene and anthracene. The recent American work was conducted with the idea of studying anthracene formation from a quantitative standpoint and the relation of temperature to the reaction. When considered in conjunction with Cobb's results the work is of considerable importance, and in some respects the two sets of investigations are in agreement. The American investigators worked only between 800° and 1,000°C. and do not appear to have taken into account the influence of different atmospheres. They concluded, however, that the optimum temperature for the formation of anthracene is 925°C., and that above that temperature the formation of carbon occurs very rapidly. Again, this optimum appears to be at the point at which the sum of the yields of the diphenyl and carbon is a minimum.

Chemists as Salesmen

In our issue of October 8 last we called attention to the difficulties which have latterly beset the college-trained chemist who is waiting to be absorbed in the chemical industries. During the most active period of the war it was commonly believed that the country would continue to sustain its intensive development programme, and that as numbers of trained chemists were released by the Government they would be readily requisitioned by private undertakings who would welcome the opportunity of profiting by their exceptional experience. At that time, however, the peacetime programmes were visualised without any thought of the exceptional trade conditions which ultimately prevailed, and the letter which we published from a correspondent last week clearly shows that for

the time being there are more chemists than vacancies. Thus, instead of being at a premium in the market, the chemist, whatever his calibre, is at a discount, and qualifications of an exceptional order are no guarantee of gaining employment. On all sides, fortunately, there is a general indication that industrially we are approaching more stable conditions; but, even so, reabsorption of the excess *personnel* is likely to occur but slowly.

Problems of a similar nature have occurred in America, where our contemporary, *Chemical and Metallurgical Engineering*, has recently been insisting that chemists must be saved from throwing over their profession in disgust. A contrast is made with the electrical industry in America, and it is shown that in spite of the rush of graduates who, after completing their college training, entered the electrical profession, the large manufacturers arranged to make room for them in their testing departments. At the rate of hundreds per year they have been gradually educated to appreciate the many phases of the electrical business and have been finally tempted into the production, sales, and management departments. By diverting the technical brain into more or less commercial channels, the business heads have gained an advantage for themselves, while they have performed a great service to their own particular industry. At present there is a parallel between the state of affairs in the chemical industry and that of the electrical industry when the education of the student in this field was undertaken. There is an opportunity for the chemical industry to profit from the example of its electrical colleague, to take the surplus of technically trained men, and to employ their knowledge in educating customers up to an appreciation of technical as well as commercial considerations.

Standardisation of Quality

SPACE would scarcely permit us to follow Mr. E. V. Evans through all his interesting and comprehensive survey of solved and unsolved problems in gasworks chemistry at the meeting of the Royal Society of Arts on Wednesday, but two general points may be noted. The first is the need of a consistent standard of output. One of the drawbacks of British production in many fields has been its wide variations in quality, arising from independent manufacture by numbers of different works, and from the absence of any machinery for co-ordinating processes, methods, costs, &c. It is one of the inevitable results of the too individualist policy followed so largely in this country, and the remedy lies in a closer understanding between producers, such as prevails in Germany and the United States. The South Metropolitan Co. has set a good example in its efforts to establish a continuous standard of quality in gas, and British industry as a whole could only benefit by a more general adoption of the principle. On the subject of low-temperature carbonisation, Mr. Evans cheerfully makes some concessions in theory, while retaining the most commercially convincing argument, namely, that high-temperature gas production pays, while the low-temperature system has still to be made to pay.

Points from Our News Pages

Some notes on "The future of the Hardwood Distillation Industry" are contributed by H. M. Bunbury, M.Sc. A.I.C. (p.162)

Reviews are published of "Industrial Hydrogen" (Hugh S Taylor), "Analysis Chemistry" (F. P. Treadwell), and "Rays of Positive Electricity," &c. (Sir J. J. Thomson) (p. 163).

The Official Referee, under Part I. of the Safeguarding of Industries Act has decided that calcium carbide has been properly excluded from the Board of Trade's list of dutiable articles (p. 164).

An inquiry into a complaint that tartaric acid, cream of tartar, and citric acid are wrongfully included in the Board of Trade list (Safeguarding of Industries Act) was opened on Saturday, and will be resumed to-day (February 11). (p.166)

The Manchester Section of the Society of Chemical Industry has decided against any further inquiry, for the present, into the subject of chemical terminology. (p.167)

In a paper contributed to the Royal Society of Arts, Mr. E. V. Evans, F.I.C., takes a comprehensive review of "some solved and unsolved problems in gasworks chemistry." (p.168).

Sitting on Tuesday, Wednesday, and Thursday, the Railway Rates Tribunal decided the classification for chemicals carried by rail (p.172).

Our London chemical market report states that though orders are mainly for small quantities for prompt delivery, trade continues to show a small improvement (p.178).

In our Scottish Chemical Market Report the general trend of business is described as towards improvement, although the movement is slow (p. 180).

The Calendar

Feb. 14	Institute of Metals, Birmingham Section: "Light Aluminium Alloys." Professor F. C. Lea. 7.30 p.m.	Chamber of Commerce, Birmingham.
14	Institute of Petroleum Technologists: "The Significance of the Interpretation of the Chemical Analysis of Seepages." J. E. Hackford. 8 p.m.	Royal Society of Arts, 18, John Street, London.
15	Royal Microscopical Society: "The Micro-structure of Coal from an Industrial Standpoint." A. L. Booth.	20, Hanover Square London.
15	Society of Glass Technology: Meeting. 2.30 p.m.	Manchester.
16	Chemical Society: "A theoretical derivation of the principle of induced alternate polarities." A. Lapworth. "An explanation of the property of induced polarity of atoms and an interpretation of the theory of partial valencies on an electronic basis." W. O. Kermack and R. Robinson. 8 p.m.	Burlington House London.
16	Royal Institution: "Dyeing: Ancient and Modern." Professor A. Perkin. 3 p.m.	21, Albemarle Street London.
16	Royal Society: Papers by Professor L. Hill, D. H. Ash, J. A. Campbell, J. B. Cohen, and others.	Burlington House London.
17	Society of Dyers and Colourists, Manchester Section: "The quantitative fluorescence of Cellulose, its derivatives, and certain other substances." Dr. S. Judd Lewis.	Manchester.
20	Chemical Industry Club: "Decolourising Carbons." R. Whymper. 8 p.m.	2, Whitehall Court, London.

The Future of the Hardwood Distillation Industry

By H. M. Bunbury, M.Sc., A.I.C.

In considering the establishment of wood distillation as a permanent industry in this country many important factors have to be taken into account. In the past, wood distillation has occupied a relatively unimportant place in our chemical activities, and the industrial atrophy which has followed the termination of the war has brought about its almost total collapse. Even in the United States, where the industry has developed extensively, and where, before the war, it was in a most flourishing condition, the outlook is far from promising. In 1913-4 the United States exported 68,160,224 lb. of acetate and 1,598,776 gallons of wood spirit, of which this country took 1,039,443 lb. and 348,574 gallons respectively. In 1914-5 these figures had dropped to 24,673,247 lb. of acetate and 944,374 gallons of wood spirit, of which we imported 1,460,119 lb. and 557,589 gallons respectively.

The American operators at that time were inclined to be pessimistic with regard to the future, and quoted a variety of causes, chief among them being increased cost of labour and fuel, the chaotic state of the markets and export difficulties due to shipping restrictions. In spite of this, so great was the demand for acetone, especially by the British Admiralty, that other sources were sought for, and a great impetus given to the synthetic production of calcium acetate from acetylene, especially in Canada and the States. In this country the exigency of the situation led to the Government erecting new wood distillation factories, the already existing works being pressed to the utmost. This created a kind of boom which, as Dr. Rule pointed out (*J. S. C. I.* 40, 21, 399R) was entirely due to the abnormal conditions created by the war and was unrelated to ordinary industrial activity.

Before the war America was responsible for half the world's output of wood distillation products, and is still potentially able to maintain that figure. The figures quoted above show that we were good customers of America; they also show that we were not in a position to supply our own needs. It would appear then, that a wood distillation industry in this country would not only make for national safety but would have every chance of success, even if the home market only were catered for. The additional equipment set up by the Government would seem to provide that the means of establishing the industry are already at hand. There are, however, many factors entering into the question, and the position needs very careful and thorough consideration.

To begin with, the wood distiller will have to consider whether he can hold his own in the markets against competition from synthetic products. Take, for instance, acetic acid. Plants for its production from acetylene are already well established, and judging by the number of patents that are still appearing, no effort is being spared to make the process a commercial success. Whether the synthetic product will ever be able to compete with that from wood distillation it is impossible, in these abnormal times, to predict; but it is safe to say that, after the enormous amount of work that has been done and the large scale on which the synthetic plants have been erected, the process will not be allowed to fall through. The wood distiller must make up his mind for future competition in acetic acid, and this, of course, covers the case for acetone. Competition in the case of acetone also is to be expected from the Fernbach and other fermentation processes, particularly as efforts are being made to exploit butyl alcohol, which is produced in large quantity in the fermentation process. Acetone is also being produced from the waste liquors from wood pulp manufacture by Rinman's process, 1,000 lb. of pulp yielding 22 lb. of acetone. According to Sindall and Bacon, bamboo waste liquors yield 330,000kg. of acetone from 10,000 tons of pulp.

With regard to methyl alcohol the wood distiller has, up to the present, had matters all his own way. But Calvert has recently claimed to produce this synthetically from cheap carbonaceous materials. The commercial success of the process has, however, not yet been demonstrated, but should the claim that methyl alcohol can be produced at a cost of a few pounds per ton be established, it would deal a serious blow to the wood distiller. The Rinman process already referred to produces 388,000kg. of methyl alcohol from 10,000 tons of bamboo waste liquor. Although methyl alcohol has at present no rival as a denaturant, its position in this respect is already being assailed. In the United States there are at present five authorised formulas for completely denatured alcohol and fifty-three for specially denatured, many of which do not include methyl alcohol at all, and efforts are being made to find other denaturants.

The other main product of the industry, viz., charcoal, presents the chief difficulty. Coke has almost entirely supplanted it in iron smelting, and there is little or no prospect of its employment for this purpose in the future. The quantity used for other purposes, such as the production of pure iron, cementation of steel, as an absorbent, &c., is comparatively small, and in some other cases only special kinds of charcoal are employed. At present the only prospect would appear to be its employment as a fuel. Recent efforts in America to urge its adoption as a domestic fuel have met with some success, and the present endeavours in this country to combat the smoke nuisance, together with the high prices of coal and coke, would seem to open up possibilities. There would also appear to be prospects of its more extended use in gas producers. An interesting development in this direction has recently taken place. It has been demonstrated that road wagons can be very successfully and economically run on producer gas, using the ordinary internal combustion engine, the gas being supplied from a small producer carried on the wagon. A 4-ton lorry can be run in this way, the fuel working out equivalent to petrol at 2½d. a gallon, and using charcoal in the producer. Further, it is significant that at least one British railway has under consideration a scheme for the electrification of its system, whereby the locomotive produces the power *in situ* by means of a combination of producer, internal combustion engine and dynamo. Should these, or like schemes materialise, wood charcoal should compete successfully with the other producer fuels such as coke and anthracite. One of the chief drawbacks to charcoal as a fuel is its low density, which makes it a very bulky material to transport and store; a denser material would be desirable, and the wood distiller would have to consider the question of briquetting or other means to this end.

With regard to the utilisation of wood tar and wood oils, the suggestion made by Mr. E. C. Powell (The Chemical Age, IV, p. 552), that these may be made to yield dyestuffs intermediates is somewhat chimerical. Wood tar is a much more complicated mixture than coal tar—at least seventeen phenols have been identified as well as numerous acids, alcohols, aldehydes, ketones, lactones, aliphatic and aromatic hydrocarbons, &c. Even if a successful method of isolation of the more important constituents were established, enormous quantities of wood would have to be distilled annually in order to meet competition from the coal tar products. Another suggestion arises out of consideration of this question, however, and that is the possibility of the production of much larger yields of the tar products at the expense of acetic acid and the permanent gases (CO, CO_2, CH_4, &c.), since these latter represent sheer waste. Research directed to this end, if successful, might very conceivably change the whole outlook of the industry.

The wood distiller has, in the past, been very content to follow the beaten track. His plant and working methods were for many years, and still are to some extent, inefficient; that this is realised to-day is shown by the many recent patents covering improvements in plant design, such as those of Bergström in Sweden and Poore in this country, to mention only two. But much remains to be done before the high standard of efficiency which obtains in many of our chemical industries is reached. It is a curious fact, too, that grey or brown acetate of lime, methyl alcohol (often crude 80 per cent.), charcoal and wood tar sum up the activities of the wood distiller. He has left it to others to supply the market with the many valuable compounds for which the above products are the intermediates, thus handing over a source of income to a branch of chemical manufacture in which he should have participated. In this connection it would seem to be a feasible proposition, that the large chemical concerns would find it profitable to run a wood distillation plant in connection with their other manufactures, more particularly organic products, as such a course would ensure a cheaper supply of methyl alcohol, acetic acid, acetone, formaldehyde and other products used on a large scale, and for which the present market prices are absurdly high.

On the question of the supply of raw material it is difficult at present to say what the prospects are. Good cordwood of the most desirable species of hardwood is likely to become scarcer and consequently more expensive; on the other hand, waste wood should be available in increasing quantities. It is a good augury that the urgency of afforestation in this country has at last been recognised. The present programme of the Forestry Commissioners is modest enough, and it will be many years before their labours bear fruit—or should we say foliage?—but it is a step in the right direction, and all those engaged in the industries which employ wood as raw material, including the distillation industry, will be glad that at last something is being done.

Reviews

INDUSTRIAL HYDROGEN. HUGH S. TAYLOR, D.Sc., Associate Professor of Physical Chemistry, Princeton University. American Chemical Society Monograph Series. New York. The Chemical Catalog Co. (Inc.) 1921. Pp. 210. $3.50.

The appearance of this volume will be welcomed by all who are interested in the manufacture of hydrogen, and especially by those who have at heart the larger issue of the establishment of manufacturing processes on a true scientific basis. As early as 1861 the Patent Office began to record the claims of inventors for the manufacture of hydrogen, and it is somewhat remarkable that until the last decade no serious attempts had been made to produce hydrogen from coke and steam by application of the fundamental laws of chemical reaction to a technical problem.

The book is divided into ten chapters. The first is introductory in character; the second devoted to the steam iron process; chapters III. and IV. are descriptive of the water gas catalytic and the liquefaction processes respectively. These are followed by a brief summary of electrolytic methods and the Bergius and Silicol processes. Chapter VIII. deals with the possibility of recovery of hydrogen from hydrocarbons, whilst the last two chapters are devoted to miscellaneous methods of hydrogen production and to the purification and testing of this gas.

In the chapter on the steam iron process the scientific aspects of the problem have been clearly stated, and this, as far as the reviewer is aware, for the first time. It is satisfactory to note that the discrepancy between the two sets of values for the equilibrium constants of the water gas reaction derived from the individual reactions and from the data of Haber are now brought into agreement by the recent investigations of Chaudron, which are detailed in an appendix.

The chapter on the catalytic process of hydrogen manufacture has likewise evidently been compiled with the greatest care, and both the difficulties and the problems still awaiting solution have been clearly stated. Both the Linde-Claude liquefaction plants as well as the more typical electrolytic plants are given adequate treatment. In view of the possible developments of the Bergius process, using both carbon and iron as raw materials, somewhat more space might usefully have been allotted to this domain.

Chapter VIII. on the production of hydrogen by the thermal decomposition of the hydrocarbons, although at present chiefly of theoretical interest to hydrogen manufacturers, is especially valuable to those interested in the problem of fuel cracking, and shows clearly the general utility of the Nernst approximation formula. The brief but excellent descriptions of the methods at present in vogue for the removal of carbon monoxide from hydrogen indicate clearly the great advance made by catalytic methods in recent years. It might be noted that phosphine also appears to be amenable to treatment by a selective combustion process.

If criticism were needed, structural details of technical plants, as well as the various essential operating data, such as catalyst manufacture, tray space, linear and space velocity, and the like, of the various catalytic methods discussed in the volume would augment the value of the book very considerably. Both Dr. Taylor and the American Chemical Society are to be congratulated on their work.

ERIC K. RIDEAL.

ANALYTICAL CHEMISTRY. Vol. I. QUALITATIVE ANALYSIS. F. P. TREADWELL. Translated from the German and revised by WILLIAM T. HALL. John Wiley & Sons. London: Chapman & Hall. Pp. 597. 23s.

This very comprehensive book, comprising the fifth edition of the work, is entitled to rank with one or two other classical books, like those of Fresenius and Noyes, as amongst the best treatises on analytical chemistry. It is difficult to conceive of any known reaction for cations and anions which is not referred to, and the book will prove of great value to advanced students, and also serve as a most useful book of reference for chemists generally.

The old routine "testing" associated with the laboratory teaching of chemistry is fortunately largely a thing of the past, but intelligently treated and applied systematic analytical chemistry may be very valuable; indeed, it is indispensable for anyone claiming to be a fully qualified chemist. But the reactions must be regarded in the light of modern ideas on the nature of dissolved substances and the interaction of ions, and such important considerations as equilibrium and mass action given their full value. In these matters the present volume is very sound, Part I. being devoted to the consideration of these fundamental principles and their bearing on analytical chemistry.

Parts II. and III. are devoted to the reactions of the metals (cations) and acid constituents (anions), and these reactions are remarkably complete. At the end of each group analytical tables, with detailed methods of procedure, are given, there being generally two or three alternative methods. The study of these should be valuable to students as a corrective to the view so often prevalent that there is some stereotyped method which is alone applicable, and that qualitative analysis is a merely routine proceeding.

Part IV. deals with systematic analysis, and the reactions of some (indeed, most) of the rarer elements are described in the concluding section (Part V.).

The volume is in every way thoroughly sound.

J. S. S. B.

RAYS OF POSITIVE ELECTRICITY, AND THEIR APPLICATION TO CHEMICAL ANALYSIS. By SIR J. J. THOMSON, O.M., F.R.S. Second Edition. London: Longmans, Green & Co. Pp. 234, nine plates. 16s.

The method of analysis dealt with in this book is by far the most sensitive and powerful method known. In these respects it greatly surpasses even spectrum analysis. It discovers gases present to the extent of a few millionths of a cubic centimetre, and diluted a hundredfold with other gases, whereas such dilution often renders spectrum analysis impossible, the substance present in the larger proportion swamping the spectrum of the rarer gas. The new method of analysis is to put the gas to be examined into a vacuum tube having a perforated cathode. The positively charged atoms which penetrate the perforation are subjected to simultaneous magnetic and electrostatic deflection and are then made to fall upon a photographic plate. The point of their original impact is drawn out into a parabola, the points of which represent particles having the same ratio e/m of charge to mass, but different speeds. The electronic charge e being known (4.8×10^{-10} electrostatic units), the parabola gives us the value of the atomic weight m. If there are several parabolas on the plate, it follows that there are several substances present. Occasionally it may mean that the atom has a multiple charge, but this is indicated by the distance from the origin at which the parabola commences. The new method, unlike spectrum analysis, gives direct information concerning the atomic weight and valency of the substance examined. The present volume contains an account of additional researches since 1913.

F. D'A.

Decision on the Calcium Carbide Appeal

In Favour of the Board of Trade

On Monday Mr. Cyril Atkinson, K.C., Official Referee, gave his preliminary decision in regard to the complaint that calcium carbide has been improperly excluded by the Board of Trade from the list of dutiable articles under Part I. of the Safeguarding of Industries Act. Mr. Atkinson said:

It is understood that what I am going to say is not my formal award, and any rights that anybody has under section 19 of the Arbitration Act remain.

Questions to be Determined

In this case the complainants contend that calcium carbide has been improperly excluded from the list of dutiable articles under the Safeguarding of Industries Act. It is said that it should have been included as a synthetic organic chemical. The question for me is whether calcium carbide is or is not a synthetic organic chemical within the meaning of the Act. I think I must hold (1) that all articles not dutiable under other Acts of Parliament are *prima facie* entitled to be imported into this country free of duty; (2) that no article should be included in the list of dutiable articles under this Act unless it is reasonably certain that it is covered by the words used in the schedule (if there is any reasonable doubt, the substance ought to be excluded); (3) that the burden of proof is on the complainants. To succeed, therefore, the complainants must prove that, beyond reasonable doubt, calcium carbide is a synthetic organic chemical within the meaning of the Act.

The complainants contend that the words "synthetic organic chemical" have a technical meaning and that they must be given that technical meaning. They rely on the ruling laid down in Maxwell that phrases in technical legislation are used in their technical meaning, if they have acquired one, otherwise in their ordinary meaning. The opponents contend that the words must be construed in their ordinary commercial meaning. In my opinion, the ruling quoted from Maxwell should be applied to the present case. If the words "synthetic organic chemical" have acquired a definite technical meaning, it is my duty to give them that meaning. If not, it is my duty to find out their ordinary meaning, if they have one. If they have not a definite meaning, technical or ordinary, definable in such language as would yield a reasonably definite test for the determination of the question, the only remaining way appears to be to ask "Is calcium carbide regarded as a synthetic organic chemical by the general body of persons having the technical knowledge necessary to enable them to form an opinion?" Have the words "synthetic organic chemical" or even "organic chemical" acquired a definite technical meaning? Is there any single scientific definition of an organic chemical, generally accepted by scientific persons or a large majority of them?

Conflicting Expert Opinions

Five definitions have been advanced, four of them by the complainants, but Mr. Ballantyne said the academic definition was "compounds of carbon" with certain exceptions. He used the curious expression that this was the best so far produced. He referred to the definition, "hydrocarbons and their derivatives" as a proposed definition. Professor Perkin was very emphatic that the expression meant "compounds of carbon" without any exception at all, and that this definition should be rigidly applied. Professor Morgan's view was that the true definition ought to be "hydrocarbons and their derivatives." Mr. Hewitt had been taught by Sir Edward Frankland that an organic chemical was one in which an atom of carbon combined with hydrogen, nitrogen, or another carbon atom, but said that he himself thought that "hydrocarbons and their derivatives" was probably the best definition. Mr. Rogers thought that "compounds of carbon which contain an organic particle" was the true way of putting it. There are thus three, if not four, different views as to the technical meaning of "organic chemical" to be found in the evidence of the complainants.

The same diversity of view is found in the text books. For example, in Richter, and Perkin and Kipping, one finds the academic definition "compounds of carbon" laid down and rigidly adhered to. In Meyer & Jacobson and in Newth and many others, the definition given is "compounds of carbon" with certain exceptions. In Schorlemmer's "Rise and Development of Organic Chemistry" there is an interesting account of the different views held with respect to the precise meaning of an "organic chemical," but the discussion ends with the writer saying that "We define, therefore, that part of our science which is commonly called organic chemistry as the chemistry of hydrocarbons and their derivatives." The writer adds that even this definition does not place a sharp boundary line between organic and inorganic chemistry.

Without referring in detail to other text books, I think it is fairly summarising the position to say that the evidence of the witnesses and of the text books referred to during the hearing, show that there is not a technical meaning of the words "organic chemical" which has been generally accepted by chemists. I am satisfied that the following statement from Bassett is well founded: "There are quite a number of carbon compounds which it is difficult to classify logically as either organic or inorganic." I believe it is this difficulty and the differing opinions held as to the compounds referred to which have prevented the general acceptance of any reasonably precise definition.

Balance of Text Book Evidence

As to the ordinary commercial interpretation of the term "organic chemical," no satisfactory evidence has been tendered. I have, therefore, to take the alternative test and ask whether it has been proved that calcium carbide is a synthetic organic chemical or has been regarded as such by the general body of chemists, that is, by the general body of persons having the technical knowledge necessary to enable them to form an opinion. Even if I accepted the definition most generally given, viz., "compounds of carbon, with some exceptions," I should still be faced with the same question. The available evidence is of three kinds. There is the evidence of the witnesses called, there is the evidence of the text books, and there is the evidence derived from other literature. As to the witnesses, on the one side I have five able men well qualified to speak, who say that they regard calcium carbide as an organic chemical. On the other hand, I have five equally able men who say just the opposite. Of the five witnesses called by the complainants, four of them approached the question from the definition point of view. They say, "That is my definition, and therefore I say that calcium carbide is an organic chemical." Mr. Ballantyne clearly did not think that this was the right way in which to approach the question. His reason for saying that calcium carbide is an organic chemical was its stability under work-a-day conditions, its characteristic behaviour, and the fact that carbon is the characteristic part of the molecule.

I do not know that the fact that the witnesses have different reasons for their convictions is very material, and I am quite satisfied that the evidence of these five witnesses establishes the fact that a large body of scientific opinion regards calcium carbide as an organic chemical. But the evidence on the other side is equally convincing and establishes the fact that there is also a large body of expert opinion which does not regard calcium carbide as an organic chemical. The same result is arrived at from an examination of the text books. The text book test ought to be the test most in favour of the complainants, for one would naturally expect text book writers to lean towards the academic point of view. The strongest statement in favour of the complainants is found in Richter, who says in terms that calcium carbide is organic, but he also says that carbon dioxide and carbon monoxide are organic, whereas it is conceded that they are not so regarded. He simply takes the academic definition and rigidly adheres to it. Perkin and Kipping adopt the same rigid rule, but although they adopt the academic definition, it is noticeable that calcium carbide is dealt with in the inorganic volume, and that in the organic volume it is mentioned but once. On the other hand, in Meyer and Jacobson it is stated that organic chemistry embraces all compounds of carbon except the simplest. Another writer, Newth, says in terms that calcium carbide is regarded as belonging to the organic division. Moissan, in his book on inorganic chemistry, published in 1904, says, "Organic compounds are not studied in this treatise. You will not find here any other combination of carbon except metallic carbides, carbonates, cyanides

cyanates, &c." Von Groth gives carbides as one of the groups of inorganic compounds. Moissan, in his book on the electric furnace, treats the products therein discussed, which include calcium carbide, as inorganic chemicals.

It is conceded that 90 per cent. of the text book writers include, or deal with, calcium carbide in the inorganic branch. It is said that this is done merely for the sake of convenience. Why should it be more convenient to deal with calcium carbide as a compound of calcium rather than as a derivative of acetylene unless it is that the writers know that their readers will naturally look in the inorganic section for information about it? It is inconceivable, to my mind, that there should be the vast majority of writers treating calcium carbide as if it were an inorganic chemical and that it should never occur to one of them to say, "You must not be misled by my treating calcium carbide as inorganic; it is only done for convenience; it is really organic."

Calcium Carbide not an Organic Chemical

The more I think of it, and I have thought of it a good deal, the more weight do I find myself giving to the text book evidence. I repeat that I cannot believe writers would almost universally be discussing and treating calcium carbide as if it were inorganic unless they regarded it as inorganic or probably as inorganic. In addition to the evidence from text books, there are the Patent Office publications, and the Swiss and Italian tariffs, and, for what it is worth, the view taken in the United States by the Treasury Department, and there is the classification in the "Chemists' Year Book." In my opinion, the classification in this book is very significant.

With regard to the question as to generally accepted views, it is unnecessary to go into further detail. I think I have said enough to indicate the basis of my opinion, which is that it has not been proved that calcium carbide is generally regarded as a synthetic organic chemical by the majority of chemists. It is quite clearly established that a large body of technical opinion takes the opposite view. I have not dealt with the term "synthetic," but it is useful to point out that there does not seem to be unanimity as to the meaning even of that word. Sir Arthur Colefax, in his reply, laid great stress on the fact that the structure of calcium carbide was generally regarded as that of acetylene, and that therefore it must be an organic chemical within the hydrocarbon definition. It seems to me that the force of that argument rests upon the acceptance of the definition, but that definition cannot be put higher than that it is a suggested definition, and the author of it warns us that even this definition does not fix a sharp boundary line between organic and inorganic chemistry. At any rate, that argument has not carried with it the general body of expert opinion, and I have come to the conclusion that it is not possible for me to say that I am satisfied that calcium carbide has been improperly excluded from the list; indeed, I think it has been properly excluded, and therefore the complaint fails.

A date is to be fixed later for a discussion of points of law arising out of the above, if thought necessary by the complainants.

Is Shale Oil Profitable?

To the Editor of THE CHEMICAL AGE

SIR,—I will answer this question (appearing in your editorial note of January 14) emphatically in the affirmative and point out a few facts regarding the shale oil industry. There are deposits of shale in the empire which will produce more oil of a better grade and at a lower cost than has ever been produced from underground lakes or deposits of oil, with a surety and regularity that no oil field can approach, and the cost of this production is far below the cost of producing by drilling holes in the ground and pumping.

One of the shale deposits of the British Empire, the Government geologists assert, comprises 1,800,000,000 tons. A plant distilling 10,000 tons of this shale per day would require 600 years of 300 working days to exhaust the deposit. I have just completed tests on average samples taken on this deposit several miles apart. The average production per ton is 125 gallons of water free oil, some of the shales running as high as 138 gallons. The average specific gravity is .852. The maximum temperature of the oil production is 850° Fahrenheit.

Statistics show us regarding the cost of drilling a hole in the ground for oil that for every well which produces oil, at least nine are bored fruitlessly. The cost of drilling an oil well is at least £10,000, therefore ten holes with one oil producer will cost £100,000. The average production of oil from a well is 10 barrels a day (this is high), so that to produce a well from which 10 barrels per day are obtained costs £100,000. This can be compared with the first cost of installation of a shale retorting plant. £100,000 will erect and equip a retorting plant capable of treating at the lowest estimate 250 tons of shale per day. 250 tons of shale per day would yield 31,250 gallons of oil or 625 barrels of 50 gallons each. Every oil well that has ever been drilled must eventually cease to flow and be abandoned. With the shale deposit it is entirely different. The amount of shale obtainable is easily calculated and the life of the deposit known, so the element of chance is entirely eliminated.

Oils properly manufactured from shale are as amenable to refining as any of the natural crude oils, and in many instances are of a superior quality both as to spirit and lubricating productions. Taking, as an example, one ton of shale as mentioned above which produces 125 gallons of water free oil, the values upon refining would be as follows:

65 gallons	motor spirit	at 3s.	per gallon	£9	15	0
25 ,,	lamp oil	at 1s. 6d.	,, ,,	1	17	6
25 ,,	lubricating oil ..	at 2s.	,, ,,	2	10	0
10 ,,	vaseline or 95 lb.	at 4s.	,, lb.	19	0	0
				£33	2	6

In addition there would be produced from this ton of shale 1,200 cubic feet of gas from the retort and upon totally gasifying the residue a further quantity of 21,000 cubic feet.

1,200 cub. ft.	from retort at 600 British Thermal Units per cub. ft.	720,000
21,000 ,,	,, upon total gasification of residue at 260 British Thermal Units	5,460,000
	Total British Thermal Units	6,180,000

This gas will supply sufficient power for mining, sufficient heat for retorting and refining, and leave a surplus of at least 50 per cent. for other industrial purposes. The cost of mining this shale will be 3s. per ton and for retorting and refining not to exceed 3s per ton.

The above shows over £30 net from oil production. To this can be added sale of surplus power, gas and 40 lb. of sulphate of ammonia per ton. The sulphate of ammonia would be collected from the total gasification operation and not from the retort. The temperature required for the liberation of the nitrogen content of shale is so high that it is a chemical and physical impossibility to produce oil at the same time.

The Scottish shale industry was never efficiently conducted for the production of oil; the main objects were wax and sulphate of ammonia. The retorts were of a type not conducive to the production of oil, and all improvements that have been made upon the original retort of Young's time have been made with the object of increasing the production of sulphate of ammonia. No industry can be conducted successfully without efficient and super-efficient methods being observed in every detail. This is not a peculiarity of the shale industry but appertains to all industry. All low grade shales or shales producing from 20 to 30 gallons of oil per ton must look to the potential power factor of their residues for commercial success. Without this aim in view, failure is a foregone conclusion. Efficiency in mining the shale, efficiency in retorting, efficiency in refining and efficiency in power production must be the watchwords of every low grade shale enterprise.

The shale deposits of the various countries are the future source of oil, and when the development is seriously taken up, the boring of holes in the earth for oil will be relegated to the inefficient rubbish heap. I have tested shales from nearly every country in the world, and the majority of them are on the high grade side, that is, above 60 gallons to the ton, so that the question asked regarding the commercial possibilities of shale oil can have but one answer, it is a commercial industry with no element of chance such as prevails with oil wells.—Yours, &c.

Willesden, February 6. NAT. H. FREEMAN.

Tenders Invited for Hydrochloric Acid

THE Bulgarian postal authorities invite tenders, by March 27, for the supply of 500 kilograms of hydrochloric acid, to be delivered within four months. Tenders, accompanied by a deposit of 10 per cent. of the total amount of the tender should be addressed to the District Office of Finance, Rue Rakovski 102, Sofia, Bulgaria. Particulars may be obtained from the Department of Overseas Trade (Room 50), 35, Old Queen Street, London. The reference no. 7110/F.E./P.N. (3), should be mentioned.

Tartaric Acid, Cream of Tartar, and Citric Acid

Another Inquiry Opened

ANOTHER inquiry was opened before Mr. Cyril Atkinson, K.C., the Referee appointed under Part I. of the Safeguarding of Industries Act on Saturday, February 4. In this case it is complained that tartaric acid, cream of tartar and citric acid have been wrongly included in the Board of Trade list. The names of the complainants who were stated to be British firms were not disclosed at the inquiry for certain reasons, but it was stated that the Manufacturing Confectioners' Alliance and the National Union of Mineral Water Makers had thrown in their lot with the original complainants, represented by Sir Arthur Colefax, K.C., and Mr. Swan. The complaint was opposed by Messrs. Campbell, Bishop, & Co., Ltd., the Phœnix Chemical Co., Ltd., and Messrs. Howards & Sons, the last only so far as citric acid is concerned. The opponents were represented by Sir Duncan Kerly, K.C., and Mr. Courtney Terrell. The Board of Trade was represented by Mr. Whitehead.

The Complainants' Case

SIR ARTHUR COLEFAX, opening the case for the complainants, said they claimed that cream of tartar was not a synthetic organic chemical, but a natural product, imported into the United Kingdom, and that it was not an analytical re-agent. It was used in connexion with food, confectionery, the manufacture of aerated waters, and the dye industry. It had never been regarded in the chemical trade as a fine chemical. It was a heavy chemical, and was not manufactured by fermentation processes, it being a natural constituent of grape juice. One or all of the substances were used to a very small extent for analytical purposes, but the fight was actually as to whether or not they were fine chemicals. He did not know on what grounds the Board of Trade had conceived them to be fine chemicals. During the years 1910 to 1920 the total imports of cream of tartar into the United Kingdom varied between 2,000 and 4,000 tons a year. During the war there were comparatively small quantities coming in, mostly from France and Italy. The imports of tartaric acid varied between 1,000 and something over 2,000 tons a year during that period, and again France and Italy were our chief sources of supply during the war. A large quantity of both these substances was imported from Germany before the war. As to citric acid, he only had the figures for 1920; the total was 197 tons, again from France and Italy. These were the products of warmer countries than this, and there were no raw materials here; their source was argol, which was the crude tartar. Cream of tartar was undoubtedly a prepared body, but it existed as such in the argol, and was obtained by a process of crystallisation. The Board of Trade might seek to make out that in the manufacture of these bodies there was some outstanding chemical skill required. If that were so, he would combat that idea, because his clients conceived the process as one of relative simplicity. Again, the bodies were used in very large quantities, and it was a very serious thing to put such a substance as cream of tartar in the list. Another point was that Part I. of the Act concerned the safeguarding of "key" industries, and the preparation of these bodies in this country could not possibly be considered as a key industry. Unless it could be proved that it was a key industry, it seemed to him there was an end to the case. There was not an ounce of the raw material in this country.

THE REFEREE asked whether argol came into the country free.

SIR ARTHUR COLEFAX said it did. It contained about 25 per cent. of tartaric acid.

MR. WHITEHEAD made it clear that the Board of Trade had never regarded it as part of its function to state whether or not the production of a particular article was a key industry. Therefore, there should be some direction given which would guide parties as to how far the question of whether or not an industry was a key industry was to be considered. The Board of Trade could not allow itself to be put into a position in which it would be regarded as a taxing authority. If it were established that a particular substance was a fine chemical, the Board was bound to put that substance into the list. It was not open to it to consider whether or not it was a key industry.

THE REFEREE, in order to help in keeping the evidence to the point, said there were four things to consider: (1) The precise facts about the substances; (2) was there a reasonably definite trade meaning of the term "fine chemical"? (3) if so, what was it? and (4) were these substances regarded in the trade as fine chemicals?

Evidence of Chemical Merchants

MR. A. F. BUTLER (a director of Messrs. R. W. Greeff & Co., Ltd., chemical merchants, of London) produced a number of his firm's catalogues dating back for a number of years, in which citric acid, tartaric acid and cream of tartar were placed under the heading of technical chemicals. Citric acid was described as crystals, sold in 5 cwt. casks; tartaric acid, in crystals and powder, was sold in 5 cwt. casks; cream of tartar, ground free from metals, was also sold in 5 cwt. casks. In an advertising booklet issued by the firm some fifteen years ago, headed "Chemicals for textile fabrics," citric acid and tartaric acid were included. The firm called them heavy chemicals. Technical chemicals were chemicals of a heavy nature. Also, in the catalogue, there was a heading, "Fine chemicals and pharmaceutical preparations," and the three bodies were not included under that. The term "fine chemical" only had a trade meaning. In a list issued by the firm in January, 1922, citric acid was included under the heading "fine chemicals and pharmaceutical products," but not the other two bodies. The reason was that the lists went to different types of buyers. Quite a number of heavy chemicals were sold to wholesale druggists.

Replying to questions by SIR DUNCAN KERLY in cross-examination, the witness said that his firm distinguished between heavy and fine chemicals according to the class of people to whom they were offered. Heavy chemicals were those not used for medicine, roughly speaking. Sir Duncan suggested that the witness would put anything down as an industrial chemical which would appeal to people engaged in manufacture. The witness replied that to a certain extent that was so.

In reply to MR. WHITEHEAD, the witness agreed that there were some fine chemicals used for technical purposes. He used the term "technical chemicals" as synonymous with "heavy chemicals."

MR. W. G. WILSON (a director of Messrs. Chas. Page & Co., Ltd., chemical merchants, London) agreed substantially with the evidence given by Mr. Butler. He had not, in his experience, heard the three bodies called fine chemicals in the trade. He had dealt with orders for cream of tartar amounting to as much as 20 tons.

Cross-examined by SIR DUNCAN KERLY, the witness agreed that fine chemicals could be used in some cases for industrial purposes.

MR. WHITEHEAD pointed out to the witness that in certain publications chemicals were divided into pharmaceutical and heavy chemicals. Citric acid was amongst the pharmaceutical chemicals, and not the heavy chemicals.

MR. WILSON replied that he had seen that substance under two headings in that paper.

Re-examined by SIR ARTHUR COLEFAX, the witness said that tartaric acid and cream of tartar were mainly used in the textile industry. They were also used in the mineral water and confectionery trades, and in some pharmaceutical preparations, but he would say they were heavy chemicals.

Replying to the REFEREE, the witness said that about 75 per cent. of the tartaric acid sold by his firm went to the dye industry, as also did about 50 per cent. of the cream of tartar. The bulk of the citric acid, he believed, was used in industries other than the textile industry.

MR. P. J. KUHNE, market clerk in the heavy chemical department of Messrs. Victor Blagden & Co., also said that cream of tartar, tartaric acid and citric acid were dealt with as heavy chemicals.

MR. W. KIRBY, F.I.C., ex-president of the British Pharmaceutical Conference, and associated with Messrs. Dewsbury & Brown, of Manchester, mineral water manufacturers, also spoke to the same effect. He explained the process by which cream of tartar is obtained from the crude argol and said he did not regard it as a highly skilled process, although he had had no actual experience of it personally.

SIR ARTHUR COLEFAX said he would be calling the actual manufacturers, but Mr. Kirby had said what he believed as a chemist took place, and it did not differ from the other evidence that was to come.

The inquiry was then adjourned until to-day (Saturday).

Society of Chemical Industry

Manchester Section

THE fifth meeting of the session was held on Friday, February 3, at the Textile Institute, Manchester, Dr. E. Ardern, F.I.C., presiding. Papers on "The Estimation of the Nitro Group in Aromatic Organic Compounds, Part II," and "The Use of Potassium Bromate in Volumetric Organic Analysis," prepared by T. Callan, M.Sc., Ph.D. and J. A. Russell Henderson, D.Sc., jointly, were read.

Chemical Terminology

The Chairman announced that the sub-committee of the section had held a special meeting to discuss the question of chemical terms, and, in view of the results of similar meetings held by other sections of the society—such results being that it was not possible to form any definite consensus of opinion as to the proper interpretation to be placed upon the chemical terms under discussion—it was thought it would not serve any useful purpose to call a special meeting of the section at the present time for the purpose of further investigating the adoption of more correct nomenclature in regard to chemical substances. The Hon. Secretary (Mr. L. G. Radcliffe) and himself would, however, attend the meeting of the council in London, and if any further developments took place at that meeting this might cause the sub-committee to reconsider their decision.

Estimation of the Nitro Group in Aromatic Organic Compounds, Part II.

In this Paper the authors explain that they have extended the work previously published on the estimation of "Nitro Compounds" (*J. Soc. Chem. Ind.* XXXIX. 1920, 86T-88T), which dealt with certain difficulties experienced in the determination of aromatic nitro groups by the Knecht-Hibbert reduction method. They confirm the results previously given that the use of titanous chloride for this purpose often gives erroneous results owing to simultaneous chlorination and reduction, and give further examples. The use of titanous sulphate eliminates this source of error. The authors have, however, found that titanous chloride containing a minimum amount of hydrochloric acid in presence of an excess of sulphuric acid acts similarly to titanous sulphate even with substances, such as a nitronaphthalene, which readily chlorinate.

Another source of error in the ordinary procedure for the determination of nitro groups by reduction with titanous salts is loss by volatilisation during the boiling necessary for reduction, so that in many cases quantitative results can only be obtained by working under a reflux condenser. Many examples illustrating these sources of error were given and the effect of varying the conditions of analysis was also indicated.

p-Nitroaniline was recommended as the ultimate standard against which titanous solutions should be standardised, and it was shown that solutions of sodium nitrite, potassium bromate, nitrodiazobenzene chloride solutions, &c., could also be standardised against this substance, and then could be used for the volumetric determination of a considerable number of hydroxy and amino derivatives of benzene and naphthalene. The advantages of having one ultimate standard, *i.e.*, *p*-nitroaniline for the greater part of the intermediates used in the dye industry were briefly described.

It was shown, contrary to recent published statements, that many substances, in particular mononitrohydrocarbons and their mono- and polychloro-derivatives, could be quantitatively determined with titanous sulphate provided the sources of error above referred to were eliminated, and the experimental conditions described were adhered to. Finally, the results obtained in the analysis of a number of nitro compounds not previously recorded were tabulated.

Messrs. Knecht & Foster, and Miss Robinson took part in the discussion.

Potassium Bromate in Volumetric Organic Analysis

In this paper the authors gave an account of some of the applications of potassium bromate in volumetric organic analysis. The method, which was first used by Koppeschaar in 1876 for the estimation of phenol, and which has since been employed by many experimenters, notably Vaubel, who has shown its wide application for the estimation of amino and hydroxy aromatic compounds and their derivatives, depends upon the absorption of bromine by the compound under analysis when this is supplied in a nascent condition by the interaction of a standard solution of potassium bromate and excess of potassium bromide in presence of a mineral acid. The authors gave a detailed account of the preparation of the potassium bromate solution, its standardisation and its application to some substituted phenols and anilines.

The three main factors governing bromination by means of nascent bromine are found to be in the case of aromatic compounds (*a*) orientation of the groups forming the compound, (*b*) nature of these groups, and (*c*) the temperature of the reaction. The effect of these factors in a number of typical bromate titrations was discussed.

The application of the method to the direct estimation of dinitrophenol in picric acid, thiocarbanilide, a substance which has become of some technical importance, diphenylamine, and cinnamic acid where the bromine is absorbed by addition and not substitution, was described, with details of the analytical procedure required.

Messrs. Ardern, Radcliffe, Foster, Simpkin, and Varley, and Miss Robinson took part in the subsequent discussion.

A vote of thanks to the authors was passed on the motion of Dr. Paul, seconded by Mr. Varley.

Catalysis at Solid Surfaces

Recent Researches Described

DR. E. F. ARMSTRONG and Dr. T. P. Hilditch gave an account of their recent work on catalysis at solid surfaces at the monthly meeting of the London Section of the Society of Chemical Industry on Monday.

Dr. Armstrong began by calling attention to the growing industrial importance of catalysis and the manner in which it is surrounded by a mass of mathematics and elaborate technology, and explained that he intended to place the matter before the meeting in the simplest possible chemical language. Bearing on this, he said he had looked up some of the text books in order to make himself acquainted with modern views, but had found great difficulty in following them on account of the highly mathematical manner in which the subject was treated.

The Paper did not go into great detail concerning the authors' intermediate compound theory, but it was explained at sufficient length to give a clear understanding of it. It was gone into in full detail in a Royal Society Paper a few years ago, and Dr. Armstrong referred his audience to that Paper. Among the facts brought forward on the present occasion, as the result of the work done by the two authors, was that when the bulk gravity was high, high catalytic activity was obtained and among the slides shown was one which illustrated the fact that the surface most accessible to excess of liquids determined the activity. Kieselguhr was mentioned as a material having pre-eminently the greatest volume and bulk gravity, and therefore very suitable for using as a support to a catalyst. There were, the authors pointed out, many other supports, and in connexion with supports generally, it was shown how important it was to ascertain that these did not have any effect on the reaction. In other words, care must be taken to ensure that the support was not what had been called an anti-catalyst.

The first consideration was, continued the authors, to get maximum surface, and the next the state of the surface. There could be substances which were absolutely clean chemically, and those which obtained their purity as the result of the impurities present. The best results, however, could only be obtained—and that was illustrated in connexion with the authors' intermediate compound theory—with the purest of materials and the greatest care in working. From this, the authors went on to show how by these methods they could obtain straight line reactions, and some remarkable curves of this character were shown. The last matter dealt with was that of adsorption, the development of the views upon which was briefly traced and their relation to the subject of catalysis indicated. Dr. Armstrong apologised for putting the matter forward in such a simple manner and for pointing out many things which were, or ought to be, obvious, but he had done so, he said, because so many people overlooked these fundamental facts.

There was an interesting discussion at the conclusion of the Paper.

Solved and Unsolved Problems in Gasworks Chemistry

Comprehensive Survey by E. V. Evans, F.I.C.

At a meeting of the Royal Society of Arts in London on Wednesday, Mr. E. V. Evans, F.I.C., chief chemist to the South Metropolitan Gas Co., presented a paper in which a comprehensive survey was taken of "Some solved and unsolved problems in gasworks chemistry." Mr. W. J. U. Woolcock, M.P., presided.

Naphthalene Deposits in Mains

Gas engineers, Mr. Evans said, had been much harassed in the past by naphthalene, which separated out in a solid form and reduced the carrying capacity of mains and services. This was a question for the chemist, who was hardly justified in studying the more interesting questions of the retort house or of the efficiency of gas appliances if the gas manufactured could not, without interruption, be relied upon to reach the consumer's appliances owing to naphthalene stoppage. Gas technologists had been led astray in the past as a result of relying upon certain naphthalene vapour pressure determinations made by Allen in 1900. From his determinations it would be inferred that wet coal gas at the freezing point was saturated by 6 grains of naphthalene per 100 c. ft., but recent investigation by Dr. J. S. G. Thomas had shown that this was incorrect and that saturation was attained with only 0·8 grains of naphthalene per 100 c. ft. The original investigator's curve was approximately correct for the higher temperature, but his results were misleading over the temperature interval, which was of the greatest interest. These determinations of vapour pressure referred to the weight of naphthalene that saturated the gas under varying conditions of temperature and were made by ascertaining the weight of naphthalene existing as vapour when gas was in contact with an excess of solid naphthalene. It did not follow that the gas was incapable of retaining as naphthalene vapour quantities greater than indicated by the curve. This aspect of the question, which was a highly complex one, had not been studied; the deposition of naphthalene was influenced by the state of motion of the gas, the rate of change of temperature, and probably also by the nature of other hydrocarbons present.

Owing to the absence of precise knowledge of the conditions which govern the deposition of naphthalene from coal gas, the question had been referred to as the "Naphthalene Bogey," and would frequently seem to be regarded as phenomenal. Naphthalene deposition was indeed so complex that there existed a school of gas technologists who believed that to gain perfect immunity from annoyance, all naphthalene should be extracted from the gas before it left the works for distribution. By complete extraction of naphthalene was meant that the gas passed through an aqueous solution of picric acid at the rate of 1 c. ft. per hour for twenty-four hours gave no precipitate, or perhaps so little that it was unweighable on an ordinary chemical balance.

Ordinary anthracene or heavy oil resulting from the distillation of coal tar was an efficient solvent for naphthalene, but the oil as ordinarily distilled itself contained naphthalene and was thus unsuitable for the complete extraction of this hydrocarbon from gas. If, for example, air were drawn through a sample of anthracene oil, it would be seen that a copious precipitate was obtained by washing that air subsequently with an aqueous solution of picric acid. Bueb, in Germany, used this medium for naphthalene washing in 1902, but the washed gas contained from 3 to 4 grains of naphthalene per 100 c. ft. and reference to the vapour pressure curve would show that this quantity represented the saturation point of wet gas at 13°C. (0·57°Fahr.). If, however, the oil were steam distilled before use and then applied systematically to the gas stream in a compartment washer-scrubber, the complete extraction of naphthalene might be effected. An equal quantity of air as in the previous experiment, when drawn through steam-distilled oil, was seen to give no precipitate with aqueous picric acid. This oil was used in a washer-scrubber of ten bays and flowed in contra direction to the gas at the rate of about 15 gall. per million c. ft. of gas. The spent oil flowing from the final bay possessed a concentration of 6 to 8 per cent. of naphthalene, and the concentration decreased in each bay until in the oil inlet bay it was practically free from naphthalene. The amount of oil used was that required to remove completely the naphthalene from the gas and the figure quoted above was an average one.

This process in the case of the South Metropolitan Gas Co. extracted about 130 tons of naphthalene annually. Although the attainment of 1921 was not far from the zero line, it might still be some little while before the ideal, representing complete freedom from naphthalene complaints, was reached, as there must still exist some naphthalene left in the smaller and less used services as a heritage of former years.

The lecturer said he did not propose to deal at any length with the subject of the removal of sulphur compounds from gas. It would, however, be of interest to state that Dr. Carpenter had, within recent times, considerably improved and simplified the nickel catalytic process, and it was to be hoped that he would communicate to the gas industry the nature of this work when completed.

Removal of Hydrogen Sulphide

The method of removing hydrogen sulphide from coal gas by means of oxide of iron, though almost universally practised to-day by gas undertakings, was an ancient process. The chemist had been unable to recommend an alternative so trustworthy and economical as to render it obsolete. In the ideal process the value of the recovered sulphur or sulphuric acid should be at least equal to, if not greater than the cost of operating the process. The present method was not only a financial burden to the gas undertakings, but was also open to criticism in other respects. The physics of the process was unsound, in that a gaseous impurity at an initial concentration of 1 per cent. by volume was extracted by means of a solid reagent. Again, the expenditure involved in handling large masses of solid oxide of iron in times of high labour costs accentuated the advantages that must accrue by discovering a simple process based on the use of a liquid reagent. Further, the presence of small quantities of hydrogen cyanide in the gas resulted in the formation of ferrocyanides which rendered a proportion of the iron inactive during each cycle, and led to the oxide becoming prematurely inactive. Finally, the efficiency of the oxide depended to a large extent on its physical nature, and its selection was a matter of considerable importance. To avoid excessive labour costs due to the handling of large masses of solid material, and to allow of the selection of a rapid yet simple reaction uninfluenced by other constituents of the gas, the tendency in recent years had been to develop a wet method of purification in which the solutions and suspensions might be dealt with by pumping machinery. The fundamental reaction upon which by far the majority of the purification processes invented were based was that of the oxidation of hydrogen sulphide to sulphur and water vapour:

$$2H_2S + O_2 = 2H_2O + 2S$$

This was, indeed, the resultant reaction of the iron oxide process, the hydrated ferric oxide merely acting as an intermediary, which reacted with the hydrogen sulphide in the gas and was regenerated by contact with air, either *in situ* or externally.

In viewing the reaction from this aspect and knowing also the ease with which hydrogen sulphide combined with oxygen, it was natural that the first attempt to discover a simple process would lie in the direction of endeavouring to oxidize the hydrogen sulphide in the coal gas mixture by a process of preferential combustion. Thus the experimental work would consist in conducting coal gas first over oxidizing materials which, at slightly elevated temperatures, would carry out this reaction, or adding to the gas such a proportion of air or oxygen and then passing the mixture over a contact or catalytic substance, again at slightly elevated temperature to promote the preferential combustion of hydrogen sulphide to sulphur and water vapour. If this reaction could have been induced to proceed satisfactorily it would not have been a difficult matter to remove the condensed sulphur by means of either filtration or electrical precipitation.

A careful study of the properties of a large number of oxides was made, but attempts to oxidize preferentially the hydrogen sulphide of coal gas either by heated oxides or by the addition of air in the presence of a contact material or catalyst had been unsuccessful. In the first place it was most difficult to prevent the oxidation of certain other constituents of the coal gas mixture; but the outstanding difficulty lay in the fact that a secondary reaction took place when coal gas containing hydrogen sulphide was heated. Carbon oxysulphide resulting from the interaction of carbon monoxide and sulphur was the main product of this side reaction. It

easily escaped from the reaction zone and was a sulphurous compound more difficult to remove than hydrogen sulphide.

Although finality had not been reached, from the evidence at present acquired it would appear that a satisfactory solution of the problem was not to be found upon these lines. In patents recently taken by Bayer & Co. and others this reaction of the oxidation of hydrogen sulphide was caused to take place by means of contact of the gas with highly porous material such as charcoal. After such treatment, however, very few illuminants remained in the gas mixture, and, although these might probably be recovered at a reasonable cost, such a treatment was a very drastic one. A more hopeful line of investigation lay in the use of oxidants in the cold, as not only was the cost of heating the gas avoided, but the secondary reaction referred to was obviated. The ideal oxidant should give on reduction by means of hydrogen sulphide of the gas a soluble product capable of easy regeneration to the original compound by the passage of air through the solution. The sulphur would then be the only material remaining out of solution and could be filtered off in a practically pure state.

Reduction of Dyestuffs

It was well known that certain dyestuffs were readily reduced to colourless or faintly coloured products, known generally as leuco-compounds, which, in turn, were easily reoxidized to the parent dyestuff. Indigo, for example, was insoluble, but gave a soluble reduction product (indigo white). The dye was fixed upon the fibre by immersion of the fabric in the soluble leuco-compound, and then by subsequent exposure to air the fast colour was produced. It was found that hydrogen sulphide in gas was capable of effecting the reduction of certain dyestuffs which in turn reoxidized to the original dyestuff by the passage of a current of air. The sulphur naturally remained out of solution. Investigations were made to discover those dyes which were both soluble themselves and had soluble leuco-compounds so as to obtain the ideal type of oxidant. Soluble dyes forming insoluble leuco-compounds could be used, but their reduction products required a large and unreasonable excess of air for their oxidation. Unfortunately, few dyes of the required type could be found.

The reduction of such dyes by hydrogen sulphide in neutral solution proceeded, if at all, only very slowly, and consequently an accelerator had to be used in the form of some basic substance. Alkali carbonates and bicarbonates were very effective for this purpose, but unfortunately so much sulphur was lost owing to the formation of salts of polythionic acids that the use of such compounds was prohibitive. Turning to the organic bases as accelerators, pyridine and allied compounds were found to give the best results, since other types frequently underwent gradual oxidation during the aeration process and consequent conversion to inactive substances. Pyridine was especially advantageous, since pyridine-water mixtures acted as solvents for certain leuco-compounds otherwise insoluble in water, *e.g.*, leuco-methylene blue. The use of this solvent allowed therefore a wider choice of dyestuffs.

With such an organic base as promoter no loss of sulphur occurred, but unfortunately pyridine owing to its high volatility could not be used in the gas stream without also installing a recovery plant. Higher boiling basic coal tar fractions of the quinoline series might also be used but these necessary refinements materially altered the simplicity and financial aspect of the process, and up to the present, interesting though the chemical aspect of these reactions might be, it had not been possible to recommend the abolition of oxide purification.

Other processes that had from time to time been proposed for the displacement of oxide of iron did not present the simplicity of such oxidation reactions as those indicated, and it was to be hoped that before long it would be possible to report success along these lines, effected either by inorganic or organic reagents. The indications of to-day were not unfavourable.

Carbon Monoxide Bogy

Parliament had decreed that coal gas should be free from hydrogen sulphide, and had instituted a severe test in which the gas was passed over papers previously immersed in lead acetate solution, but the lecturer pointed out that tobacco smoke contained quite appreciable quantities of the toxic gas carbon monoxide. It had been found, for example, that the smoke from a cigarette contained up to 1 per cent., whilst that from a cigar smoked irregularly contained up to 7 per cent.

During last year a committee appointed by the Board of Trade under the chairmanship of Sir William Pearce reached the important conclusion that no limit should be placed upon the percentage of carbon monoxide to be contained in the gas distributed to the public. This committee was fully alive to the toxicity of carbon monoxide and to the responsibility it might be called upon to take by arriving at this decision, but to be read into their decision was their belief that the gas industry was now equipped with men of science at the University of Leeds, South Kensington, and other centres, and the safety of the public can be entrusted to the gas undertakings. The chemist would play an important rôle in deciding upon any change that for economic reasons might warrant an alteration in the constitution of the gas supplied.

Consistent Standard of Output

For many years the German dye industry had adopted the practice of manufacturing a colour of high purity—in some cases reaching 100 per cent. chemical purity—and before sale had slightly diluted their product with a harmless material. This practice was not resorted to for the purpose of defrauding the customer, but it allowed a manufacturer to become assured that each delivery from the works should be consistent as regards the quantity of colour contained in it. The dyer knew, and implicitly relied upon the fact, that each unit weight of material taken by him would have the same dyeing effect. If there was one thing above all others that the chemist attached to the chemical industry soon learned to appreciate it was the necessity of maintaining the output of a consistent product. The tar distiller supplying anthracene, naphthalene, carbolic acid, &c., for the chemical market had to work to a well-defined specification.

The sales staff of a chemical undertaking continued to urge their technical colleagues to produce, if possible without additional cost, an article, be it creosote, pitch, anthracene, sulphate of ammonia, &c., which should, in competition with other similar products, establish its supremacy on the market by superiority in the particular quality for which it was required. It was useless to attain superiority without consistency of output. A not unimportant duty of the chemist in the gas industry was to aid the gas engineer to produce from a heterogeneous material coal products, be they gas, coke, tar, or ammoniacal liquor, of consistent quality. He regretted that one of the clauses of the Parliamentary Bills which the gas industry joined in framing, namely, that relating to the necessity of supplying a consistent product by limiting the variations permissible in the calorific value of the gas supplied, was not contained in the final Acts.

Low Temperature Carbonization

The next most important product of the gasworks from the point of view of revenue was coke, and it is upon this product that chemists must turn their attention. He did not advocate the practice of low-temperature carbonization. Not only was the financial balance sheet of low-temperature carbonization less satisfactory than that of the manufacture of straight coal gas as practised to-day, but the great increase in the quantity of coal which would have to be carbonized, the difference in the nature of the products—particularly of the gas and the tar—the simultaneous creation of a market for the solid fuel, in addition to the disabilities surrounding the balance sheet, were all factors to be considered. It was not difficult to analyse the attitude of mind of the organic chemist on this question, but it was one thing to appreciate the attitude of mind and another to revolutionise a stable industry, when the financial advantages were certainly not apparent. The gas industry was one with which the organic chemist could not be expected to be in immediate sympathy, as its basic process was one of destructive distillation. The industry was, indeed, a poor training ground for the organic chemist, who, after long training, during which he learned to handle and conserve organic molecules during a reaction in the laboratory (which meant obtaining a high yield of the required product) was naturally shocked at the ruthless destruction of the coal constituents during high-temperature carbonization. It did not, however, take long for this discouragement to disappear, for he was rapidly made aware of the fact that high-temperature gas production was a financially sound proposition. The carbonization of coal at low-temperature was not in itself unsound, and it would probably be practised more largely in the future.

Society of Public Analysts

AT the ordinary meeting on Wednesday, February 1, held at the Chemical Society's Rooms, Burlington House, Mr. P. A. Ellis Richards (President) in the chair, certificates were read for the first time in favour of : —

Honorary member, Sir R. Robertson, K.B.E., F.R.S.

Ordinary members : Messrs. R. T. Colgate, D.Sc. (Lond.), F.I.C., H. J. Foster, F. N. Appleyard, A.I.C., H. D. G. Holt, B.A. (Cantab.), Shozaemon Keimatsu, and J. Miller, F.I.C.

Certificates were read for the second time in favour of : Messrs. J. L. Lizius, B.Sc., A.I.C., H. M. Mason, M.Sc. (Sheffield), F.I.C., T. McLachlan, A.I.C., C. M. Caines, F.I.C., and G. N. Mukerjee, B.Sc. (Cal.).

The following were elected members of the society : Messrs. J. C. Drummond, D.S. (Lond.), F.I.C., A. W. Long, J. C. Mellersh, and C. H. Wright, M.A. (Cantab.), F.I.C.

In the course of a paper on " The Quantitative Separation of Nitrobody Mixtures from Nitro-glycerine," the authors, William Dickson, F.I.C., and W. C. Easterbrook, pointed out that in the process of explosive analysis it was frequently necessary to separate nitrobody mixtures from nitroglycerine, as these substances were taken out together in the extract. The authors had worked out a method of determining nitrobody in presence of nitroglycerine depending upon the destruction of nitroglycerine with either ferrous chloride or ferrous sulphate in the presence of methyl alcohol to inhibit a further nitration of the nitrobody. The nitrobody was then recovered by extraction with ether and weighed. The reaction was conducted in the cold to prevent loss of nitrobody by volatilisation. Details of procedure were given by the authors.

Annual Meeting

The annual general meeting of the society was held on the same date, when the President (Mr. Alfred Smetham) delivered his annual address. The following were elected officers and council for the ensuing year :

President, P. A. Ellis Richards.

Past-presidents, Leonard Archbutt, A. Chaston Chapman, Bernard Dyer, Otto Hehner, Samuel Rideal, Alfred Smetham, E. W. Voelcker, J. Augustus Voelcker.

Vice-presidents, F. W. F. Arnaud, C. A. Keane, G. W. Monier-Williams.

Hon. Treasurer, Edward Hinks.

Hon. Secretary, E. Richards Bolton.

Assistant Hon. Secretary, R. G. Pelly.

Other members of council, S. F. Burford, B. A. Burrell, R. L. Collett, C. H. Cribb, B. S. Evans, Norman Evers, H. Heap, J. H. B. Jenkins,, Andrew More, Raymond Ross, W. R. Schoeller, C. J. H. Stock.

A Discussion on Bleaching

AT a meeting of the Midland Section of the Society of Dyers and Colourists on Wednesday, February 1, a discussion on " Bleaching " was opened by Mr. S. J. Pentecost, Major S. R. Trotman, and Mr. G. F. Hardcastle.

It was pointed out that in the ordinary lye boil, owing to causes which are difficult to remove some parts of the goods are more exposed to strong alkali than others. The effect is seen sometimes in tendering or local shrinking, and also in uneven dyeing. The dye affinity is very sensitive to partial mercerisation. A comparison was made between the sulphur dioxide and the hydrogen peroxide bleach. The former does not give a quite pure white, and the colour is apt to return, especially after alkali treatment. Sulphurous acid is difficult to get rid of and causes some dyes to fade. The old fashioned process of stoving with sulphur produces notable quantities of sulphuric acid which has been known to rot the cotton part of union fabrics. The peroxide bleach gives a pure and permanent white owing to permanent destruction of natural colouring matters. The hydrogen peroxide used should be analysed at frequent intervals as it loses strength fairly quickly. It was suggested that manufacturers might make up their own hydrogen peroxide as required from barium peroxide. Potassium permanganate applied in acid solution was proved by some experiments (Major Trotman) to be an excellent and cheap bleach. The small amounts of manganese oxides formed are got rid of by a sulphurous or sulphite bath. Figures of cost were given. An error in previous applications of this process has been the employment of a needless excess of permanganate.

Modern Gasworks Practice

Co-operation Between Management and Men

AT the second annual dinner of the Commercial Gas Co.'s Recreation Club, held at the Talbot Restaurant, London Wall, on Friday evening, February 3, the prizes won by members of the billiard section were presented by Mr. Alwyne Meade, who presided, to Mr. F. G. Dettmar, Mr. C. J. Gill, Mr. F. Baker, and Mr. A. E. Rowe.

In acknowledging the toast of his health, proposed by Mr. L. F. Tooth, who referred to Mr. Meade's valuable work for the gas industry as a teacher, author, and practical engineer and manager, the chairman referred to the immense developments, technical, scientific, and commercial, which had taken place during his experience in connexion with gas-works practice. The applications of gas to domestic, public, and commercial uses had been greatly multiplied, and on the technological side there had been constant progress in methods of gasification and in the production and conservation of by-products. Rapid as the progress had been, it was far from having been completed, and there was need of steady research and application to perfect existing processes and plant, and to secure further advances. Every worker in this field, from the lowest to the highest, could feel that he was taking part in a highly scientific and intensely interesting industry, and one which was vitally linked up with the public interest. They were happy in the possession of an efficient and contented staff, and he attributed that to the fact that they all looked upon one another as colleagues, and constituted, in fact, a united fellowship of workers, intent on attaining the highest degree of technical efficiency and commercial success.

The toast of the club was proposed by Mr. W. Fisher, and responded to by Mr. J. A. Baker, and that of " The Visitors " was proposed by the chairman, and acknowledged by Mr. F. E. Hamer (editor of THE CHEMICAL AGE) and Mr. W. Press.

Safeguarding of Industries List

Further Complaints of Inclusion and Exclusion

THE Board of Trade have received formal notices of complaint under section 1 (5) of the Safeguarding of Industries Act in respect of the following articles :—(1) Lactose " R," mucic acid, synthetic camphor, calculating cylinders, planimeters, and integrators (planimeter type), which, it is contended, have been improperly included by the Board of Trade in the lists of articles chargeable with duty under Part I. of the Act ; and (2) synthetic resin and products made therefrom which, it is contended, have been improperly excluded from the aforesaid lists. These complaints will be submitted in due course to the referee appointed by the Lord Chancellor, and any persons directly interested in any of them should communicate immediately with the Board.

Nauru and Ocean Island Phosphates

MR. H. B. POPE, one of the Board of Commissioners dealing with the phosphate deposits on Nauru and Ocean Islands, has drawn up a report on the commercial exploitation of these islands. According to the Sydney correspondent of the *Times*, Mr. Pope is of the opinion that there are on these islands not less than 100,000,000 tons of high grade phosphate. How much more there might be he finds it impossible to say, as the comparatively few fields classed as " worked out " were abandoned, not because the phosphate was exhausted, but because it had become difficult to work. About 3,750,000 tons have already been removed, and it is anticipated that the total annual output of the two islands will soon reach 500,000 tons.

Furnaces for Esthonian Oil Shale

THE Ministry of Trade and Industry of Esthonia invite competitors to participate in a competition for the best type of furnace for the combustion of Esthonian oil shale. The competition will be open until March 15, and twelve prizes, ranging from 9,000 to 100,000 marks, will be awarded for the best designs submitted of the following types of furnaces : (1) Railway locomotives ; (2) stationary steam boilers and locomobiles ; (3) central heating ; (4) forges for various metallurgical purposes ; (5) lime burning ; (6) stoves and fireplaces in dwelling-houses. Further particulars may be obtained on application to the Esthonian Legation, 167, Queen's Gate, London, S.W.7.

Affairs of Steadman Brothers

A SITTING was held at the London Bankruptcy Court on January 31 for the public examination of Steadman Brothers (Percy Valentine Steadman and Alfred Hawkridge Steadman), merchants, Cubitt Town Wharf, Cubitt Town, London, E. The failure occurred in November last and the debtors had submitted a statement of affairs showing unsecured liabilities £4,090 and net assets £128 (*See* THE CHEMICAL AGE, Vol. V., p. 705). In August, 1919, the debtors, with borrowed capital, began to manufacture cheap soap, which was then in great demand, but this venture was not a success, and early in 1920, with a view to saving establishment charges and reducing the cost of production, they entered into an agreement with a firm of manufacturers and merchants. Under this agreement the latter, in consideration of one-half of any profits, arranged to provide the necessary facilities and also materials and plant for the manufacture of the soap on their premises at Cubitt Town Wharf, where they (debtors) continued to trade under the name of Steadman Brothers. In March, 1920, there was a slump in the price of soap, and in the following month they discontinued manufacturing. They afterwards dealt in chemicals, but the chemical market declined in September, 1920, and at the time they held a large stock, part of which was subsequently used in the manufacture of Glauber salts, the remainder being sold at a loss. Their business was brought finally to a standstill in March last, and a creditor, who had obtained judgment in 1919, afterwards obtained a receiving order. They attributed their failure to the slump in trade; loss on the realisation of 45 tons of soda ash; bad debts; and to their having to pay damages in respect of breaches of contract. The examination was closed.

Losses on Guano Shipments

MR. THOMSON WILLIAMSON, described in the Receiving Order as Thomson Williamson & Co., 15, Cullum Street, London, E.C., applied for his discharge at the London Bankruptcy Court on Tuesday.

The Official Receiver reported that the Receiving Order was made in May, 1915, and proofs of debt admitted amounted to £8,780 15s. 5d., and the probable claims not yet admitted amounted to £12,004 4s. The assets were estimated to produce £41,352 14s. 8d., but had only realised £365 17s. In 1911, under the style of Thomson Williamson & Co., the debtor opened an office at Leith as an importer of copra, vanilla, and cinnamon. His brother, who was an official in the Seychelles Islands, undertook to ship the products. In May, 1912, applicant removed his office to London, and in April, 1913, his brother, on his behalf, contracted to buy the lease of twelve islands in the Seychelles group containing guano deposits for £30,000. Shipments of guano were made but not having been properly treated, were not satisfactory. As his copra trade was showing bad results he in November, 1913, proceeded to the islands and discovered that his losses were due to bad buying. He then abandoned the plantation export business and returned to London in April, 1914, and in the following month, having made a loss of £8,000 over a very bad cargo of the manure shipped to Hamburg, his bankers stopped his credit. He attributed his position to want of capital to deal with such a large undertaking, and to the losses due to the shipments of inferior guano.

The Registrar granted the discharge subject to a judgment for £400.

Oil Extraction Plant Dispute

AT Winchester House, St. James's Square, London, on Monday, the Anglo-German Mixed Tribunal gave their decision in the case, reported in THE CHEMICAL AGE last week, in which Isaac Spencer & Co., Ltd., of Aberdeen, claimed from G. Schlotternose & Co., of Germany, the repayment of £600 paid for an oil extraction plant costing 36,000 marks. The Chairman said the contract was dissolved in August, 1914, and the consequences of such dissolution were not expressly regulated by the treaty. The question in dispute had, therefore, to be decided according to the principles of equity. The debtors had spent a considerable sum of money in manufacturing the machinery, and that loss did not appear to have been covered by the value of the machinery. The Tribunal thought it equitable that the creditors should receive £400 in respect of their claim. No order would be made for costs.

Sequel to Losses on Turpentine Deals

MR. ROBERT DICKIE STEWART, paint manufacturer, of 215, Archway Road, Highgate, London, N., and 12, Marsh Gate Lane, Stratford, who was adjudged bankrupt in September last, attended at the London Bankruptcy Court on January 31 for public examination on a statement of affairs showing gross liabilities £14,414, of which £13,682 was expected to rank for dividend, against net assets valued at £2,440 (*See* THE CHEMICAL AGE, Vol. V., pp. 457 and 493). The debtor, examined by the Official Receiver, said that in 1883, with a capital of £1,500, he began business in his own name at 61, Mansell Street, Aldgate, London, as a paint, colour, and varnish manufacturer and merchant. He traded there until June, 1921, and then removed to 12, Marsh Gate Lane, Stratford, London, E. He began to borrow money in 1908 in order to meet losses incurred on deals in turpentine, and ever since that date he had been obliged to borrow from time to time in order to finance the business. His present position was due to losses on contracts for the purchase of turpentine, linseed oil and leads, to heavy interest on borrowed money, heavy taxes and the high cost of living, ill-health, the slump in trade, and the cost of removing to Stratford. Since September, 1920, he had incurred a net loss in trading of £4,294. The examination was concluded.

A Zinc Oxide Contract

IN the Court of Session, Edinburgh, on February 2, before Lord Ashmore, Morris Ashby, Ltd., of 17, Laurence Pountney Lane, London, sued the North British Rubber Co., Ltd., Edinburgh, for £1,450 with interest and expenses. The pursuers averred that in November, 1920, they sold to the defenders 100 tons of zinc oxide. Delivery of 50 tons of the oxide was accepted by the defenders, but they refused to accept the remainder on the ground that they had not agreed to the pursuers' stipulation that the price must be paid in cash upon delivery. Owing to the defenders' refusal to take delivery, the pursuers instructed the sale by public auction in London of the quantity of oxide in dispute. The difference between the price realised at that sale and the price which the defenders had agreed to pay (£60 per ton) amounted to the sum which the pursuers in this action claimed as damages for the defenders' breach of contract. Defences were lodged, but were withdrawn, and the diet of proof was discharged, the defenders consenting to the pursuers getting decree for the whole sum sued for, with interest and expenses.

Liverpool Chemist's Wrongful Dismissal Claim

AT Liverpool Assizes on Tuesday, before Mr. Justice Branson, Dr. H. E. Annett sued Evans, Sons, Lescher & Webb, Ltd., for damages for alleged wrongful dismissal. It was stated on behalf of the plaintiff that he had invented the preparation known as "Liverpool Virus," used for killing rats and mice. In 1911 the defendants took over a bacteriological laboratory at Runcorn and employed Dr. Annett as its superintendent.

It appears that last year, following the apprehension of a certain foreman, who admitted and was fined £50 for having charged the time for certain men who had not worked upon a particular job which defendants were carrying out in connexion with the laboratory, the plaintiff was summarily dismissed from the defendants' employ, and when he asked for an explanation the defendants held him responsible for the foreman's offence. For the defence it was urged that the whole thing was partisan from beginning to end, and Dr. Annett had allowed friendship to distort his discretion with regard to his duty to his employers. Mr. Justice Branson remarked that instant dismissal was a serious blot upon anybody. Dr. Annett had not acted in any sense dishonourably to his employers, and there would be judgment for him for a half-year's salary, £225, with costs.

Institution of Welding Engineers

AT the meeting of various sections of the welding industry held on January 26, it was resolved that a new society, to be known as the Institution of Welding Engineers, be formed. The society will embrace all systems of welding, and anyone interested in welding and allied industries will be eligible for membership. The hon. secretary is Mr. C. Raggett, 30, Red Lion Square, London, W.C.1.

Railway Rates Revision

Amended Classifications for Chemicals

At the Royal Courts of Justice on Tuesday the Railway Rates Advisory Committee, which is entering on the final determination of the proposed general railway classification of goods by merchandise trains, commenced the hearing of objections by traders to the railway companies' proposals in regard to Group 9—Chemicals.

Mr. Dennison, for the Federation of British Industries, said the most important points from the traders' point of view were exceptional rates and a reduction for quantitities.

Mr. Pike, for the railway companies, said that it would be quite impossible to make a detailed investigation of each rate. Exceptional rates covered about 75 per cent. of the total traffic, and the railways realised that a large number of these rates must continue. In regard to the following entries in the provisional classification which provide that the traffic be only carried at owner's risk, the railways were prepared to expunge owner's risk provision :—Calcium chloride solution; calcium nitrate solution; and calcium sulphydrate solution (all in owner's tank wagons, 8 ton loads) naphthalene, crude (creosote salt) in owner's wagons, 6 ton loads; oils in Class II. in owner's tank wagons, 8 ton loads; petroleum and shale, crude, for refining, and paraffin or petroleum, burning, both in owner's tank wagons, 8 ton loads.

The railway companies desired that the entries relating to the following products, which in certain circumstances are accepted at owner's risk, should be amended to show that in such cases the traffics will only be accepted as "damageable goods not properly protected by packing":—Bottles, and bottle stoppers, glass, common, not packed; carboys, glass, empty, which are not protected by basketwork or tubs; cellulose acetate in strong close texture sacks; crucibles, plumbago or clay, not packed; glassware, e. o. h. p., if not in cases, casks, or crates; glucose in vessels not so closed as to be proof against leakage; hydrogen peroxide, solution, of not more than 40 volume strength in oak casks; acid phosphate of lime in sacks; magnesium chloride in carboys; essential oils, if not packed as prescribed; bismuth ore, cinnabar, cobalt, molybdenum, silver, and tungsten, if not in wooden casks or cases; quicksilver, if not in iron or steel bottles or in strong stoneware bottles, packed in cases; clay retorts, not packed; and saccharine, if in vessels not closed so as to be proof against leakage.

The first objection, in regard to copper sulphate, was put forward by Mr. Fern for the Association of British Chemical Manufacturers. As from 90 to 95 per cent. of the copper sulphide manufactured in this country was exported, the Association, while not objecting to Class 13 for the home trade, felt that special provision should be made for export.

The Tribunal ruled that the exceptional rate for copper sulphate be maintained in Class 10.

Mr. Fern then suggested that a classification should be arranged for brine in owner's tank wagons, and asked for it to be placed in Class 1. Mr. Pike did not think there was any need for special classification as the traffic was limited.

The Tribunal ruled that brine should be placed in Class 2.

The question of nitre cake was then discussed by Mr. Fitton, who maintained that the price obtainable now for this product was often less than the cost of carriage. Not only was it unprofitable, but the railway companies would not provide wagons for its carriage. Mr. Pike referred to the destructive action of the nitre cake on the railways' wagons, and pointed out that even when it was carried in owner's wagons special attention had to be paid to it by railway officials, as wagons were likely to break down.

The Tribunal directed that nitre cake should remain in Class 8 generally, and in Class 5 when in owner's wagons.

A witness proposed that distilled water in carboys should be put in Class 13. It was specially packed, and the glass was protected with straw and with an iron or wicker hamper and then with a cask, so that the risk of breakage was small.

The Tribunal directed that this item should remain in Class 16.

With regard to the entry for quilla bark, the traders' representative asked that the words "and brewing" be added. A representative of the Yorkshire Dyeware and Chemical Co. submitted evidence relating to mimosa bark for tanning.

The Tribunal ruled that a new item should be made for quilla bark in Class 13, and that bark for tanning should be in Class 9 with the addition "a minimum of 4 tons per truck."

Barks, herbs and roots were next dealt with, and the traders' representative submitted that Class 18 was very high for products such as these, which were very easily handled.

The Tribunal directed that the railway companies proposa should stand and that dye and colour intermediate products should all go into Class 16.

In regard to dye extracts and dyes there was a difference of opinion between the chemical trade and the railways on the definition of pigments. Definitions were supplied by Dr. Morley on behalf of the traders and by Mr. L. Archbutt for the railway companies.

The addition of the words, "and colours other than pigments" to the item, "dye extracts" dyes and was ordered.

The hearing was continued on Wednesday, when objections relating to colours in paste form, dye extracts, and dyes (Clayton Aniline Co.), silicate of soda, sulphate of soda, soda ash, permanganate of potash, "Rocmac," earth colours, lithopone, barytes, spar, gas liquor, and creosote were dealt with. Evidence was given by Messrs. Kershaw, Fitton, Fern, Cooper, Malacrida, Ferguson, Lukes, and Dr. Beavis on behalf of the traders, and by Messrs. Pike, Archbutt, and Jenkins for the railway companies.

The Tribunal gave the following decisions :—Dye Extracts and Dyes : The railway companies' proposal (Class 16) to be retained. Colours in Paste Form : Dyestuffs and dye-extracts when containing not less than 75 per cent. of water, to go in Class 15. Chemicals (as defined on pp. 40 and 41 of the Revised Classification). Chemicals packed in casks, drums, cases or sacks to go in Class 18, the entry to be then continued as in List P. C. 11, or loose, if so accepted, minimum of 4 tons per truck. It was directed that no special rate should be allowed for 50, or larger, ton lots, and that there would be no lower rate than 10 for two-ton lots. Sodium Silicate Solution : "Rocmac" to remain in the same class as sodium silicate. Venetian Red : To go in Class 10. Lithopone : To remain under the same classification as white lead, so that in the event of further concessions being granted for white lead, lithopone will receive similar benefits. Barytes : That the proposal of the railway companies should stand. Gas Water or Liquor : Class 3 in owner's tank wagons, Class 6 in other packages. Creosote : In owner's tank wagons, Class 4; in casks and drums, Class 8.

The hearing was concluded on Thursday, when the following decisions were made :—Coal or Gas Tar : to be placed in Class 1. Calcium Liquor : Class 6. Silicate of Soda Solution : No alteration to be made. Pitch, Coal Tar : Class 6. Anthracene, Crude : In casks, Class 11; in sacks and owner's wagons, covered with owner's sheets, 4 ton lots, Class 10. Anthracene e. o. h. p. : Class 16. Naphthalene : Class 11 generally and in Class 10 when in owner's wagons. Pitch, Petroleum : The railway companies' classification to stand. Carbonate of Lime : Class 2 when in bulk and Class 7 when packed. Drugs (in casks, sacks, cases, crates or hampers) : Railway companies' proposal stands. Salt, Common, in Bulk : Railway companies' proposal and the 6 ton minimum to stand. Rock Salt : Class 4. Leather Shavings, Scrap and Leather Shavings for Manure : Class 7. Antimony Oxide : Class 11. Distemper : Railway companies proposals to stand. Copperas : No new entry.

Deputation on Railway Rates for Chemicals

A deputation of trade associations, including the Association of British Chemical Manufacturers, waited upon the General Managers of the Railway Companies on Tuesday with a view to securing a reduction in the existing high level of charges, which they stated were, on an average, 112 per cent. in excess of the pre-war rates. Mr. Malacrida, Transport Manager of the A. B. C. M., put forward a special case for a general reduction so far as chemical products are concerned. He said that in many cases the packages which had to be used for rail conveyance were from two to three and a-half times the weight of the chemical product, and this alone was a great tax on the industry. It was also pointed out that the rates on many chemicals were out of all proportion to the rates charged for other commodities. As an instance, 10 cwt. of sulphuric acid in carboys was charged about twice as much as a grand piano valued at £200. In the former case the traffic was at owner's risk, whereas with the latter the traffic was at the company's risk. The railway managers undertook to give serious consideration to the points put forward and to convey their decision within a month. The deputation asked that the rates should be reduced to an amount not exceeding 50 per cent. over the rates in operation on January 14, 1920.

From Week to Week

MR. LOUIS K. LIGGETT, president of the United Drug Co., U.S.A., has recently arrived in London from New York.

LORD LEVERHULME will distribute the prizes at the Borough Polytechnic Institute, London, on February 14, at 7.30 p.m.

MR. C. S. WEHRLY is *en route* for New York where he will open a branch office for Messrs. A. H. Pickering, of Tower Hill, London.

The annual dinner of the CONCRETE INSTITUTE was held at the Savoy Hotel, London, on February 2, Mr. E. Flander Etchells, president, in the chair.

At the meeting of the GLASGOW ANDERSONIAN CHEMICAL SOCIETY last week, Mr. M'George read a paper on "Drugs: Constitution and Physiological Action."

MR. H. H. SLATER has been appointed chairman of the Chemicals and Drugs Sub-Committee of the British Chamber of Commerce in the Argentine Republic.

Bell's United Asbestos Co., Ltd., and the Cape Asbestos Co., Ltd., announce that neither company has ANY CONNEXION with the Orange River Asbestos Mines, Ltd.

MR. F. A. POTTS, of Trinity Hall, Cambridge, has been nominated to occupy the University table at the laboratory of the Marine Biological Station at Plymouth.

At the next monthly meeting of the Chemical Industry Club to be held on Monday, February 20, Mr. R. Whymper will give an address on "DECOLOURISING CARBONS."

MR. W. G. VINES, who has until recently represented S. Maw, Son & Sons, Ltd., in Birmingham, has been appointed to represent Ayrton, Saunders & Co., Ltd., in the Birmingham district.

M. EUGENE TURPIN, inventor of melinite and other explosives, has recommenced litigation in the French Courts with respect to huge fortunes which he alleges have been amassed by certain persons who appropriated his invention.

Mr. Joseph Watson, chairman of Joseph Watson & Sons, Ltd., soap manufacturers, Leeds, upon whom a barony was conferred in the new Year Honours List, has assumed the title of BARON MANTON OF COMPTON VERNEY IN THE COUNTY OF WARWICK.

The Disposal and Liquidation Commission has decided that if no acceptable offer is received for H. M. FACTORY, GRETNA, as a whole before March 31, the property at that date will be partially dismantled and the remainder offered for sale in separate lots.

A KILN which will form part of a revolving furnace, weighing in all 400 tons, has been sent to Hull for shipment to France. It was manufactured by E. Allen & Co., Sheffield, and is part of an installation which French metallurgists claim will turn iron ore into steel without intermediary processes.

At the January meeting of the council of the Society of Chemical Industry, MR. J. ARTHUR REAVELL reported, on behalf of the Chemical Engineering Group, a proposal to form a committee in the U.S.A. to further the interests of American members of the group. The proposal was approved.

At a recent meeting of the Glasgow Corporation Gas Committee, OFFERS WERE ACCEPTED from Messrs. James Allan, Senior, and Son (for steel building over pitch-mixers at the Provan Chemical Works) and from Messrs. Glenfield and Kennedy (for water measuring recorders for the same works).

On Tuesday, January 24, Mr. L. G. Radcliffe, M.Sc., F.I.C., delivered a lecture to the Manchester College of Technology Evening Students' Chemical Society on "Hydrocarbon Oils." At the next meeting Captain F. S. Sinnatt, M.Sc., M.I.M.E., will read a paper on "The Constitution of a Coal Seam."

A paper on "THE SIGNIFICANCE OF THE INTERPRETATION OF THE CHEMICAL ANALYSES OF SEEPAGES," by J. E. Hackford, F.I.C., will be read at a meeting of the Institution of Petroleum Technologists at the house of the Royal Society of Arts, London, on February 14, at 5.30 p.m. Professor J. S. S. Brame will take the chair.

At the annual meeting of the SEED, OIL & CAKE TRADE ASSOCIATION, held in Liverpool on January 31, Mr. N. T. Schierwater was elected president, and Messrs. E. E. Billington, S. C. McCay, A. E. Pattinson, F. Mounsdon, A. B. Spence, A. Chrystal, C. A. Robinson, new members of the executive committee.

A paper on "The Prevention of Works Accidents," by F. W. Hunt, will be read at a meeting of the Hull Chemical and Engineering Society, on February 21.

PROFESSOR H. E. ARMSTRONG, who has consented to deliver the first Messel Memorial Lecture at the forthcoming annual meeting of the Society of Chemical Industry has chosen as the subject of his discourse, "Rhapsodies culled from the Thionic Epos, including a Discussion of the Conditions Determinative of Chemical Interchange."

An official of the Salt Manufacturers' Association on Tuesday informed a Press representative that GERMAN ROCK SALT is being pulverised and prepared as an imitation of refined table salt, and that it is being sold as of British manufacture. The Dublin Government analyst has reported that it contains magnesia in large quantities.

We regret to record the death on February 1, at Weston House, Tufnell Park Road, London, N., of MR. ARTHUR WILSON BALL, for many years managing director of Oppenheimer, Son, & Co., manufacturing chemists, of 179, Queen Victoria Street, London. Mr. Ball, who was sixty years old, was buried at Islington Cemetery, Finchley, on February 4.

The following will retire from the COUNCIL OF THE CHEMICAL SOCIETY after the annual meeting, to be held on March 30:—Vice-presidents: Sir J. J. Dobbie, Sir W. J. Pope, Professor J. B. Cohen, and Dr. H. J. H. Fenton; ordinary members of the Council: Dr. E. F. Armstrong, Professor F. E. Francis, Mr. J. A. Gardner, Principal J. C. Irvine, Dr. C. A. Keane, and Sir R. Robertson.

A general meeting of the members of the ROYAL INSTITUTION was held on Monday, Sir James Crichton-Browne, vice-president and treasurer, in the chair. The deaths of Lord Halsbury, a member, and of Professor Ciamician, an honorary member, were reported to the meeting and resolutions of condolence passed. Mrs. Wilfred Harris, Lady Hope, Miss A. Shenstone, Miss C. H. White and Mr. J. H. Woodward were elected members.

Speaking at the annual meeting of Allen-Liversidge, Ltd., on Tuesday, Mr. C. S. Gilman said that sales of DISSOLVED ACETYLENE during the past trading year had been affected to an almost negligible extent owing to the extension of its use for certain purposes. The failure of the application to the Board of Trade for the manufacture of calcium carbide to be included in the schedule under the Key Industries Act was a very satisfactory point so far as their company was concerned.

The death occurred on Tuesday morning, as a result of a collision with a motor-car while crossing the road at Hyde Park Corner, of SIR ALFRED BIRD, M.P., who from 1878 to 1905 was in sole control of the firm of Alfred Bird & Sons, Ltd., baking powder manufacturers of Birmingham. Sir Alfred was a son of the late Mr. Alfred Bird, F.C.S., analytical and manufacturing chemist. After retiring from business in 1905, he turned his attention to politics, and at the time of his death was Conservative member for West Wolverhampton.

Lecturing on Tuesday before the Liverpool University Commerce Society, the Hon. W. H. LEVER, son of Lord Leverhulme, said that articles which had been advertised extensively had suffered less from the recent trade "slump" than articles not advertised. The advertisement department, he said, was often the Cinderella of the business, but it was the honest advertising of an honest article which built up the goodwill of a business. The Press was, in his opinion, the best medium for advertising. He felt sure that, although some people asserted that they never read advertisements, they unconsciously noted them.

At a meeting of the SOCIETY OF GLASS TECHNOLOGY to be held in the College of Technology, Sackville Street, Manchester, on Wednesday, February 15, at 2.30 p.m., the following papers will be read:—"The Relative Advantages and Disadvantages of Limestone, Burnt Lime and Slaked Lime as Constituents of Common Glass Batches containing Soda-Ash and Salt-Cake. Part II." By F. W. Hodkin, B.Sc., A.I.C., and Professor W. E. S. Turner, D.Sc.; and "The Density of Soda-Magnesia Glasses and the Calculation of Density in General." By S. English, M.Sc., A.I.C., and Professor W. E. S. Turner, D.Sc. The second half of the meeting will be devoted to the continuation of the discussion on "The Melting of Glass."

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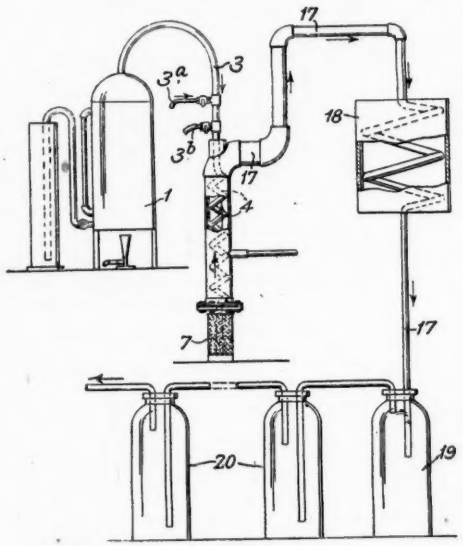
Abstracts of Complete Specifications

173,538. Reactive Acid Liquor, Alcohols, Esters and the Like from Gaseous Hydrocarbons, Process for the Production of. S. B. Hunt. Mount Kisco, N.Y., U.S.A. Application date, June 30, 1920.

The process is for producing alcohols, esters and the like containing more than two carbon atoms from hydrocarbon gases containing olefines, such as the waste gases produced in cracking petroleum oils for the production of gasolene. These gases contain an appreciable amount of olefines of more than two carbon atoms without an excessive amount of di-olefines. It is found that when such olefines are sulphonated, the strength of the sulphuric acid must be between 1.57 and 1.84 specific gravity; stronger acid produces polymerisation and weaker acid is less effective. The maximum temperature must be between 10° and 40°C., depending on the strength of the acid. A neutral liquid with a tendency to dissolve the gases, such as a hydrocarbon oil substantially insoluble in sulphuric acid, is preferably added to the acid, and the mixture is agitated by passing the gases through it. The reactive liquor produced is insoluble in the hydrocarbon, and may be separated by settling. This acid liquor is hydrolysed and distilled to obtain secondary alcohols. To obtain esters, the reactive acid liquor is diluted, treated with organic acids or salts, and distilled. This process removes propylene and butylene, and the ethylene then remaining in the gases is extracted by passing through 100 per cent. sulphuric acid. The gases are preferably first freed from traces of higher olefines by passing through sulphuric acid of specific gravity 1.8 and temperature of 50°C. The absorption of ethylene is facilitated by the presence of a neutral material such as paraffin wax in the acid, the temperature being kept above the melting point of the wax.

173,539. Conversion of Secondary Alcohols into Ketones, Process and Apparatus for. S. B. Hunt, Mount Kisco, N.Y., U.S.A. Application date, June 30, 1920.

The process is for converting secondary alcohols such as isopropyl, isobutyl and higher alcohols, into ketones by passing the vapour mixed with oxygen over a catalyst of copper gauze or wire at a temperature of 475°-800°C. The catalyst is



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arranged in a heat-interchanging device through which the incoming gases are passed to preheat them and cool the catalyst. A copper alloy such as brass may be used as a catalyst, and its surface may be treated so that it is coated with oxide. The apparatus is preferably made of iron lined with copper or brass, and the catalyst may also be of similar material and of substantial surface. Satisfactory results are obtained with alcohols containing water up to 25 per cent. *e.g.*, a constant boiling point mixture of isopropyl alcohol and water containing 90.4 per cent. of alcohol may be used. The alcohol vapour from a still 1 or liquid alcohol from a pipe 3a is passed into a pipe 3 and mixed with air supplied through a pipe 3b. The mixed vapour passes downwards through a coil 4 where it is heated by gases ascending from the reaction chamber 7. The proportion of oxygen may be somewhat less than that necessary to convert the alcohol completely into ketone. The chamber 7 is heated initially to red heat to start the reaction which then continues without further heating. The vapour from the tube 4 passes downwards through a central tube in the chamber 7 extending nearly to the bottom, and then passes upwards through the surrounding catalyst consisting of layers of wire gauze. The ketone vapour passes through a pipe 17 to a condenser 18, and the liquid ketones are collected in a vessel 19. Scrubbers 20 are provided to wash the residual gases, which may then be mixed with additional oxygen or air and used again in the process.

173,540. Phenyl Glycine Compounds. British Dyestuffs Corporation, Ltd., Imperial House, Kingsway, London, W.C., H. Levinstein and G. Imbert, Crumpsall Vale Chemical Works, Blackley, Manchester. Application date, July 2, 1920.

Phenyl glycine compounds have been obtained from trichlorethylene by treating with sodium ethylate in alcohol, then converting the resulting dichlorvinyl-ether into chlor-acetic-ester or chlor-acetic acid, and then treating these substances with aniline to obtain the phenyl glycine compounds. In the present process alcohol is dispensed with as a solvent and the intermediates are not isolated. Trichlorethylene or tetrachlorethane is heated with aniline and an alkaline substance such as milk of lime in an autoclave to 140-190°C. until the intermediates are all converted into phenyl glycine compounds. The intermediates, if isolated, can be further converted by heating with alkali hydrates. Detailed examples are given of the preparation of the calcium and sodium salts of phenyl glycine.

173,545-6. Vulcanising Rubber, process of—and the Manufacture of an Accelerator for use therein. H. Wade, London (From the Goodyear Tire and Rubber Co., Akron, Ohio, U.S.A.). Application date, July 6, 1920.

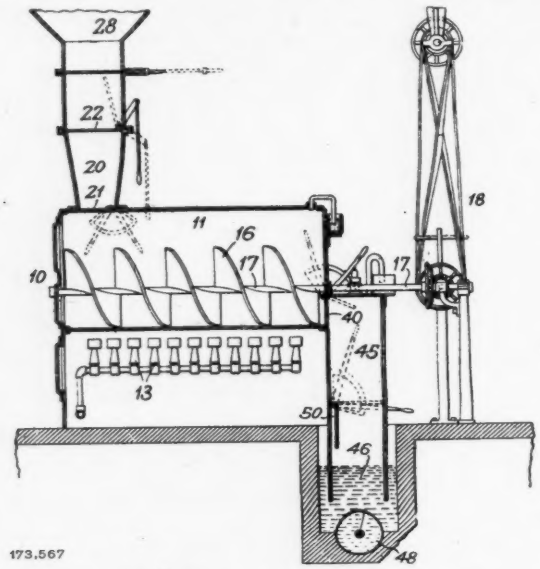
173,545. Paranitroso-dimethyl-aniline has been used as an accelerator in the vulcanisation of rubber, and the present process is for producing from this and other paranitroso derivatives, strongly basic accelerators which are more stable in storage and less poisonous. The paranitroso compounds are treated with more than one, and less than two molecular equivalents of hydrogen sulphide in neutral solution. The para group may be an amino group, a substituted amino group, or an hydroxyl group. In an example paranitroso-dimethyl aniline is dissolved in benzol or water, and hydrogen sulphide passed through until the desired amount has been absorbed. The product is strongly basic and reacts rapidly with carbon bisulphide with liberation of hydrogen sulphide and evolution of heat. Paranitroso-phenol may be treated in a similar manner. The accelerator is added to the rubber mixture in the proportion of 0.5.—2 per cent.

173,546. When the basic compounds described in Specification, No. 173,545 are treated with carbon bisulphide substituted thioureas are produced which are also accelerators of vulcanisation. Other bases such as para-dimethyl-phenylene-diamine may also be used. These compounds may be produced by the direct action of carbon bisulphide on the bases, and the liberation of hydrogen sulphide may be made use of in a cyclic process, in which it is used for reducing the paranitroso compound simultaneously with the reaction of the product with carbon bisulphide. The reaction takes a cyclic course when once initiated. In another example a carbon bisulphide solution of paranitroso-dimethyl-aniline and aniline is treated with excess of hydrogen sulphide, yielding a mixture of the para-amido compound and thiocarbanilide. Other mixtures of thiourea derivatives are also described.

173,567. Lithopone, Manufacture of. J. L. Mitchell, 17, West 108th Street, Manhattan, New York. Application date, September 1, 1920.

The object is to obtain lithopone of the desired density and opacity by complete calcination, and to avoid the formation of zinc oxide. The precipitate of barium sulphate and zinc

sulphide is dried and ground, and supplied from a hopper 28 through an air-lock chamber 20 closed by doors 21, 22, to the closed calcining chamber 11 of a muffle furnace 10 heated by gas burners 13. The dry powder is agitated during calcining by means of helical blades 16 mounted on a shaft 17, which is driven by a reversing mechanism 18 alternately in opposite directions. One end of the chamber 11 is provided with a door 40 normally closed, but which may be opened to discharge the



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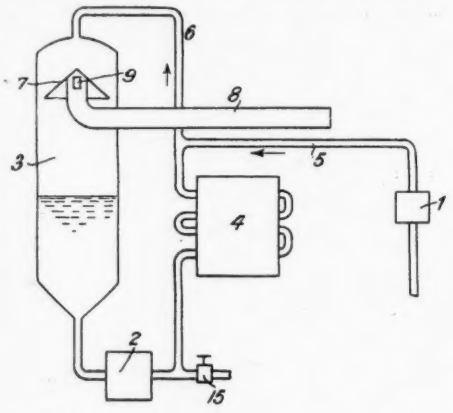
calcined material. After the material has been calcined at 700°—950°C., it is discharged into the chamber 45 closed by a door 50. The door 40 is then closed, and the door 50 opened to discharge the material into a water conduit 46, through which it is conveyed under water by a helical conveyor 48. By this means the material is quenched without access of air, and oxidation of the zinc sulphide is thus avoided, but if desired zinc oxide may be formed in a desired proportion by admitting air.

173,624. Decolorising Carbon, Manufacture of. J. N. A. Sauer, 43, Johannes Verhulststraat, Amsterdam. Application date, October 9, 1920.

The object is to produce a decolorising carbon from a vegetable material so that it retains the fibrous structure of the vegetable material. The raw material, preferably granulated wood, is heated gradually to 400°C. during about 6 hours, and the gaseous products are continuously drawn off by suction. The resulting charcoal is then heated to 1,200°C. for about six hours and super-heated steam is passed over it. The product is then heated to 1,500°C. for about 3 hours in an atmosphere of nitrogen, and then cooled and disintegrated in a ball mill. The disintegration is not carried beyond the stage at which the material would pass through a 90-mesh sieve, so that the fibrous structure of the charcoal is retained. It is found that improved decolorising, purifying, and filtering properties are thus obtained. This product may be compressed into tablets by the use of binding agents such as cane sugar and lactic sugar, which are not absorbed by the carbon and do not reduce its activity. The rapidity of filtering through this carbon is greater than with amorphous carbon.

173,644. Dehydrating Hydrocarbon Emulsions and/or Distilling Hydrocarbon Oils or their products of Distillation, Process and Apparatus for. The Asiatic Petroleum Co. Ltd., and W. Cameron, St. Helens Court, Great St. Helens, London, E.C.3. Application date, Oct. 21, 1920.

In the removal of water from hydrocarbon oils known as "salty crudes," difficulty is experienced in the usual heating appparatus owing to the deposition of the soluble salt from the water on the heating surface in the form of scale. This scale is a bad conductor of heat and causes overheating and destruction of the heating surface. This deposit of solid salt may occur even when the temperature of the oil is considerably below the boiling point of water. The object is to avoid these difficulties by evaporating the water out of contact with heated surfaces. The apparatus is charged originally with oil containing no water, which is circulated in a closed cycle by a pump 2 through a heater 4 and pipe 6 to the top of the vaporising chamber 3, and thence back to the pump. The oil to be treated is injected by a pump 1 through a pipe 5 into the closed cycle so that it is delivered on to a spreader 7 covering the



173,644.

vapour outlet pipe 8 which is provided with openings 9. The circulating oil is heated in a heater 4 to a temperature above 100°C. so that the water in the injected oil is evaporated in the chamber 3. The liberated salts remain in suspension in the oil without any tendency to adhere to metal surfaces, and a portion of the oil is withdrawn through the valve 15 for distillation in ordinary stills. The apparatus is also suitable for distilling hydrocarbon oils, which are injected through the pipe 5 into a body of distilled oil.

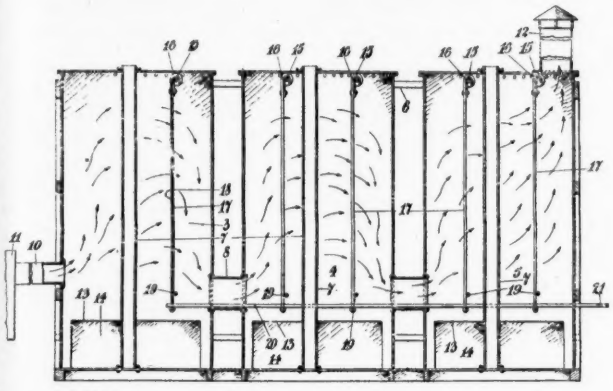
173,662. Distillation of Peat and the Recovery of the Products, Apparatus For. A. J. Robus, 1 Clarendon Terrace, Okehampton, Devon. Application date, November 8, 1920.

The apparatus is for distilling peat continuously for the manufacture of charcoal, oils, tars, ammonia and gases, and is suitable for treating peat containing up to 90 per cent. of water without any previous drying or pressing. The peat is fed from a hopper into a number of tubular metal retorts slightly inclined to the horizontal. Each retort contains a helical conveyor which compresses the peat and moves it forward continuously. The distillation is started by a furnace which heats the upper ends of the retorts not containing the conveyors, to about 500°C., and the vaporised tar, oil, &c. pass into an airtight chamber and thence to a condenser. The non-condensible gases are then returned to the furnace inlets for heating the retorts. The remaining free water is drained off at the lower ends of the retorts, and the charcoal passes into the airtight chamber and thence through doors at the side into cooling chambers where it is sprayed with water.

173,723-4. Fractional Condensation of Mixtures of the Vapours of Volatile Bodies, Apparatus For. The Selden Co., J. M. Selden and C. G. Selden, 810 House Building, Pittsburgh, Pa., U.S.A. Application date, July 5, 1920.

173,723. The apparatus is for fractionally condensing and separating the vapours of volatile substances, such as phthalic anhydride from naphthalene and various impurities, anthracene from anthraquinone, and similar purposes. The apparatus comprises a series of spaced condensing chambers 3, 4, 5 of rectangular form and substantially square in horizontal cross-section. The chambers are formed of sheet metal and are supported in a frame 6. Each chamber contains a vertical conduit 7 open at both ends and of rectangular cross-section. These conduits are of less width than the chambers and constitute baffles which are air cooled. The adjacent chambers are connected by conduits 8 of the same width as the chambers and near the bottom, each conduit having a door at one side. Each chamber is provided with doors 14 in the lower part of its side walls. Foraminous screens 18 are suspended in each chamber from horizontal rods 15 on each side of the conduits 7, except in the first chamber 3 which contains only one screen at the rear of the conduit 7. The vapour, *e.g.*, phthalic anhydride

and naphthalene, enters by the conduit 10 and the phthalic anhydride is deposited on the screen 17 in the chamber 3. The residues pass into the chamber 4 which is at a lower temperature, where a mixture of phthalic anhydride and



173,723.

naphthalene condenses, and the remaining vapour passes into the chamber 5 at a still lower temperature where the naphthalene is condensed and residual gas escapes through the outlet 12. The condensed materials are detached from the screens by the impact of the latter against stops 19, produced by a common actuating rod 20 which projects outside the apparatus.

173,724. The condensation chamber in this apparatus has its upper wall formed in a series of steps of increasing height from the inlet to the outlet end, so that the chamber increases in cross section progressively. The foraminous screen is suspended from each of the steps and cooling water is sprayed on the top of each step. A series of pivoted louvres are arranged vertically between the adjacent foraminous screens at the inlet end of the apparatus. The operation of the apparatus is similar to that described in No. 173,723 above.

NOTE.—Abstracts of the following specifications which are now accepted, appeared in THE CHEMICAL AGE when they became open to inspection under the International Convention 146,159 (Redmanol Chemical Products Co.) relating to phenolic condensation products, see Vol. III., p. 320; 146,182 (Gerb.-und Farbstoffwerke H. Renner & Co.) relating to tanning agents, see Vol. III., p. 321; 147,189 (E. N. Mazza) relating to separation of the constituent elements of gaseous mixtures, see Vol. III., p. 405.

International Specifications not yet Accepted

172,302. RETORTS. F. Frank, 660, O'Farrell Street, San Francisco, Cal., U.S.A. International Convention date, December 1, 1920.

Solid material is fed uniformly by a rotating valve 32 into a chamber 28, from which it is fed by a helical conveyer 25 to a retort 10. The material is heated by direct contact of the flame from a burner 50 burning gas, powdered coal, sawdust oil, or graphite, and any volatile products are drawn off through apertures 35 in the hollow conveyor shaft. The retort is rotated, and the residue lifted by ribs 60 into another chamber 61, from which it is discharged by a helical conveyer 64 to a valve 73, conduit 70, and tank 72. The volatile products are transferred by a fan 40 to a settling chamber 42, and then through tanks 81, 86, containing acidified water and caustic soda respectively. The gas passes to a reservoir 57 for use in the retort burner or otherwise. Coal, peat, lignite, shale, sawdust, &c., may be distilled by this means, or coke may be treated to produce water gas or producer gas and lignite to produce montan wax, &c. Illuminating gas may be distilled from oils, and light hydrocarbons from high-boiling asphaltic residues. The retort may also be used for drying or evaporating materials. Limestone or the like may be calcined, and cement manufactured. Sulphide ores may be treated to obtain sulphur, metallic sulphates to obtain sulphur trioxide, and barium carbonate or oxide to obtain the dioxide. The burner 50 may be regulated to produce an oxidising, neutral, or reducing flame. The oxidising flame is used for producing phthalic anhydride from naphthalene in the presence of mercury sulphate, for oxidising benzol to phenol, resorcin, pyrogallol, hydroquinone or phloroglucinol in the presence of thorium nitrate or mercury sulphate. The reducing flame is used in distilling mineral oils and asphalts in the presence of a phosphorus catalyst. In distilling lignite, shale, peat, or

FIG.1.

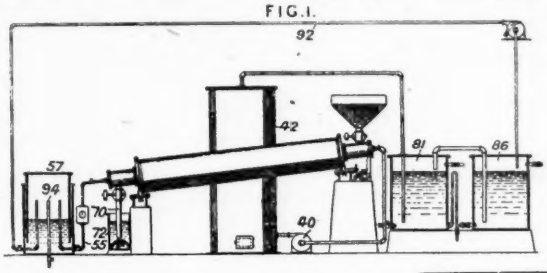
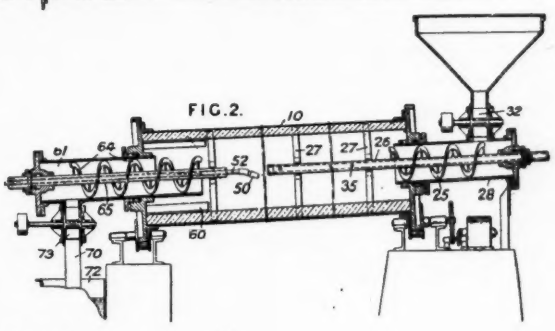


FIG.2.



172,302

wood the yield of montan wax may be improved by adding calcium phosphate. Water gas may be obtained from coke by treating with superheated steam in the presence of iron, copper, nichel, tungsten, vanadium, or their oxides or salts.

Specifications Accepted, with Date of Application

151,016. Condensation products of formaldehyde and carbamide or carbamide derivatives, Process for the manufacture of. H. John. May 16, 1918.

152,650. Distillation of fuels, Process of and retort for. Colombo & Ing. de Bartolomeis (Firm of), and R. de Bartolomeis. October 18, 1919.

152,668. Combustion of bituminous fuels and recovery of the by-products, Process and apparatus for. August 6, 1919.

152,960. Reactions upon organic bodies at temperatures of red heat or above. F. Fischer. October 22, 1919.

174,099. Separating aldehyde fatty acids from by-products accompanying their production, Process for, and manufacture of soaps from these acids. C. P. Byrnes. July 14, 1920.

174,101. Oxy-derivatives of anthraquinone, Manufacture of. M. O. Davies and Scottish Dyes, Ltd. July 23, 1920.

174,106. Saturated petroleum products from unsaturated compounds, Process for producing. A. J. Stephens. (*Canadian-American Finance and Trading Co., Ltd.*) August 12, 1920.

174,119. Pulverising mills. H. Walker. September 14, 1920.

174,124. Drying pulverulent granular or other substances, Apparatus for. A. Hofmann. September 17, 1920.

174,125. Formates of the alkali metals, Manufacture of. G. C Bacon. (*Oldbury Electro Chemical Co.*) September 17, 1920.

174,126. Oxalates of the alkali metals, Manufacture of. G. C Bacon. (*Oldbury Electro Chemical Co.*) September 17, 1920.

174,136. Leuco alizarin bordeaux and derivatives thereof. Manufacture of. W. H. Dawson. October 7, 1920.

174,143. Sulphur, Process and apparatus for the extraction of. J. Y. Johnson. (*Badische Anilin & Soda Fabrik.*) October 12, 1920.

174,147. Margarine and other edible fats, Manufacture of. W. Clayton, C. Nodder, J. F. Gill and J. N. Chaviara. October 13, 1920.

174,165. Illuminating gas and by-products, Manufacture of. J. Moeller and L. de Fonblanque. October 16, 1920.

174,245. Gas producers. J. Mawson. November 11, 1920.

Applications for Patents

Soc. Anon. des Matières Colorantes et Produits chimiques de Saint-Denis. Manufacture of 2-oxy-1-aryl-naphthylamines. Lanz, R. and Wahl, A. 2,554. January 27. (France, June 18, 1921.)

Soc. l'Azote Français. Process for production of granules of cyanamide with high nitrogen content. 1,965. January 23. (France, January 25, 1921.)

Weiss, H. Methods of introducing anodes for metal-vapour rectifiers. 2,357. January 26. (Germany, February 1, 1921.)

Market Report and Current Prices

Our Market Report and Current Prices are exclusive to THE CHEMICAL AGE, *and, being independently prepared with absolute impartiality by Messrs. R. W. Greeff & Co., Ltd., and Messrs. Chas. Page & Co., Ltd., may be accepted as authoritative. The prices given apply to fair quantities delivered ex wharf or works, except where otherwise stated. The weekly report contains only commodities whose values are at the time of particular interest or of a fluctuating nature. A more complete report and list are published once a month. The current prices are given mainly as a guide to works managers, chemists, and chemical engineers; those interested in close variations in prices should study the market report.*

LONDON, FEBRUARY 8, 1922.

ALTHOUGH orders still continue to be in the main for small quantities for prompt delivery, trade continues to show a small improvement and the undertone is firm, with few price changes to report. A number of products show a distinct tendency to advance and the Continental competition is nothing like so severe.

Export trade is still quiet, and the majority of business offered is at impossible figures.

General Chemicals

ACETONE continues firm, and is in fair request.
ACID ACETIC is higher, and stocks are very light.
ACID FORMIC is the turn higher, and in very fair request.
ACID LACTIC remains quiet and steady, with only a poor demand.
ACID OXALIC.—The price is unchanged, with a moderate demand.
ACID TARTARIC continues its uninteresting course, and is in buyers' favour.
BLEACHING POWDER.—Unchanged.
CALCIUM CARBIDE.—Only a moderate business is transacted at recent figures.
COPPER SULPHATE.—There is a moderate inquiry, but business is difficult to conclude.
FORMALDEHYDE is quietly steady, without change in value.
LEAD ACETATE remains in moderate request and the price is firm.
LEAD NITRATE has been in poor request at last quoted figure.
LITHOPONE shows a slight improvement, but business is only poor.
POTASSIUM CAUSTIC is very firm, with a fair inquiry.
POTASSIUM CARBONATE continues difficult to dispose of, and the demand is very small.
POTASSIUM CHLORIDE is quietly steady, with a moderate turnover.
POTASSIUM PRUSSIATE is scarce and firm.
SODIUM ACETATE is fairly active, considering present conditions, and the price is very firm.
SODIUM BICHROMATE has been only in poor request at last quoted figures.
SODIUM CHLORATE is moderately active, without change in value.
SODIUM NITRATE is quiet and easy.
SODIUM PRUSSIATE has been in slightly better supply, but the price continues firm.
ZINC OXIDE is quiet, without change in value.

Coal Tar Intermediates

BUSINESS during the past week has shown a slight upward tendency, on both home and export account. The improvement is not great, but there is more interest, and the actual volume is somewhat better.

ALPHA NAPHTHOL is in good demand, and the price is firm.
ALPHA NAPHTHYLAMINE has been inquired for.
ANILINE OIL AND SALT.—A small business is passing at about makers' figures.
BENZIDINE BASE is in request, and the price is steady.
BETA NAPHTHOL continues to pass into consumption, and a slight rise is anticipated before long.
BETA NAPHTHYLAMINE has been inquired for on home account.
DIMETHYLANILINE is in demand, and a fair business has been done.
DIPHENYLAMINE is very firm, with inquiries on both home and export account.
"H" ACID is steady, with a fair inquiry about.
NITROBENZOL has been inquired for, but little business is passing except for the usual regular orders.
PARANITRANILINE.—A few small orders have been placed.
PARAPHENYLENE DIAMINE is in request, and the price is firm.
"R" ACID has been inquired for on export account.

Coal Tar Products

THE market generally in coal tar products maintains an easy tone, and prices for most products have an upward tendency, although at the same time there appears to be an increased volume of business passing.

90's BENZOL is fairly plentiful, and is selling at 2s. 5d. on rails.
PURE BENZOL is quiet, with little demand, and is quoted at 2s. 10d. to 2s. 11d. on rails in the North, and 3s. 2d. to 3s. 4d. in London.
CREOSOTE OIL is weak, with little business doing, and is worth 4¾d. on rails in the North and 6d. to 6¼d. in the South.
CRESYLIC OIL is also fairly plentiful, Pale quality being quoted at 2s. on rails, and the dark quality 95/97% at 1s. 9d. to 1s. 10d.
SOLVENT NAPHTHA has also an easier tendency, and is quoted at about 2s. 3d. on rails.
NAPHTHALENE has little demand, Crude qualities being worth from £5 to £8 per ton, and Refined from £15 to £17 per ton.
PITCH.—The market is firm, with a good demand. To-day's quotations are 65s. f.o.b. London, 62s. 6d. f.o.b. East Coast, 60s.-62s. 6d. f.o.b. West Coast.

Sulphate of Ammonia

There is no change in the situation.

Current Prices

Chemicals

	Per	£	s.	d.		£	s.	d.
Acetic anhydride	lb.	0	1	10	to	0	2	0
Acetone oil	ton	87	10	0	to	90	0	0
Acetone, pure	ton	80	0	0	to	82	10	0
Acid, Acetic, glacial, 99-100%	ton	55	0	0	to	60	0	0
Acetic, 80% pure	ton	47	0	0	to	48	0	0
Arsenic	ton	90	0	0	to	95	0	0
Boric, cryst	ton	65	0	0	to	68	0	0
Carbolic, cryst. 39-40%	lb.	0	0	6½	to	0	0	7
Citric	lb.	0	2	0	to	0	2	1
Formic, 80%	ton	65	0	0	to	67	10	0
Gallic, pure	lb.	0	3	9	to	0	4	0
Hydrofluoric	lb.	0	0	8½	to	0	0	9
Lactic, 50 vol	ton	40	0	0	to	43	0	0
Lactic, 60 vol	ton	43	0	0	to	45	0	0
Nitric, 80 Tw	ton	30	0	0	to	31	0	0
Oxalic	lb.	0	0	8	to	0	0	8½
Phosphoric, 1.5	ton	43	0	0	to	45	0	0
Pyrogallic, cryst	lb.	0	7	0	to	0	7	3
Salicylic, Technical	lb.	0	0	10½	to	0	1	0
Salicylic, B.P.	lb.	0	1	4	to	0	1	6
Sulphuric, 92-93%	ton	8	0	0	to	8	10	0
Acid Tannic, commercial	lb.	0	2	9	to	0	3	0
Tartaric	lb	0	1	3	to	0	1	4
Alum, lump	ton	12	10	0	to	13	0	0
Alum, chrome	ton	30	10	0	to	32	0	0
Alumino ferric	ton	9	0	0	to	9	10	0
Aluminium, sulphate, 14-15%	ton	12	0	0	to	13	0	0
Aluminium, sulphate, 17-18%	ton	13	10	0	to	14	10	0
Ammonia, anhydrous	lb.	0	1	8	to	0	1	10
Ammonia, .880	ton	35	0	0	to	37	0	0
Ammonia, .920	ton	22	0	0	to	24	0	0
Ammonia, carbonate	lb.	0	0	4	to		—	
Ammonia chloride	ton	60	0	0	to	65	0	0
Ammonia, muriate (galvanisers)	ton	35	0	0	to	37	10	0
Ammonia, nitrate	ton	55	0	0	to	60	0	0
Ammonia, phosphate	ton	90	0	0	to	95	0	0
Ammonia, sulphocyanide	lb.	0	3	0	to		—	
Amyl acetate	ton	150	0	0	to	160	0	0
Arsenic, white, powdered	ton	42	0	0	to	44	0	0
Barium, carbonate, 92-94%	ton	12	10	0	to	13	0	0

	Per	£	s.	d.		£	s.	d.
Barium, Chlorate	lb.	0	0	11	to	0	1	0
Chloride	ton	14	10	0	to	15	10	0
Nitrate	ton	40	0	0	to	42	0	0
Barium Sulphate blanc fixe, dry	ton	24	0	0	to	25	0	0
Sulphate, blanc fixe, pulp	ton	15	0	0	to	16	0	0
Sulphocyanide, 95%	lb.	0	1	6	to	0	1	0
Bleaching powder, 35-37%	ton	14	0	0	to		—	
Borax crystals	ton	31	0	0	to	32	0	0
Calcium acetate, Brown	ton	8	0	0	to	9	0	0
,, ,, Grey	ton	10	0	0	to	11	0	0
Calcium Carbide	ton	16	0	0	to	17	0	0
Chloride	ton	7	10	0	to	8	0	0
Carbon bisulphide	ton	60	0	0	to	62	0	0
Casein, technical	ton	75	0	0	to	80	0	0
Cerium oxalate	lb.	0	3	6	to	0	3	9
Chromium acetate	lb.	0	1	1	to	0	1	3
Cobalt acetate	lb.	0	11	0	to	0	11	6
Oxide, black	lb.	0	10	6	to	0	11	0
Copper chloride	lb.	0	1	3	to	0	1	0
Sulphate	ton	28	10	0	to	29	0	0
Cream Tartar, 98-100%	ton	120	0	0	to	125	0	6
Epsom salts (*see* Magnesium sulphate)								
Formaldehyde, 40% vol	ton	82	0	0	to	83	0	0
Formusol (Rongalite)	lb.	0	3	9	to	0	4	0
Glauber salts, commercial	ton	4	5	0	to	4	10	0
Glycerine, crude	ton	70	0	0	to	72	10	0
Hydrogen peroxide, 12 vols	gal.	0	2	5	to	0	2	6
Iron perchloride	ton	30	0	0	to	32	0	0
Iron sulphate (Copperas)	ton	4	0	0	to	4	5	0
Lead acetate, white	ton	45	0	0	to	47	0	0
Carbonate (White Lead)	ton	44	0	0	to	47	0	0
Nitrate	ton	48	10	0	to	50	10	0
Litharge	ton	35	10	0	to	36	0	0
Lithopone, 30%	ton	26	0	0	to	27	0	0
Magnesium chloride	ton	10	10	0	to	11	0	0
Carbonate, light	cwt.	2	10	0	to	2	15	0
Sulphate (Epsom salts commercial)	ton	9	10	0	to	10	0	0
Sulphate (Druggists')	ton	14	10	0	to	15	10	0
Manganese, Borate	ton	70	0	0	to	75	0	0
Sulphate	ton	70	0	0	to	75	0	0
Methyl acetone	ton	85	0	0	to	90	0	0
Alcohol, 1% acetone	ton	90	0	0	to	95	0	0
Nickel sulphate, single salt	ton	61	0	0	to	62	0	0
Nickel ammonium sulphate, double salt	ton	62	0	0	to	64	0	0
Potash, Caustic	ton	34	0	0	to	35	0	0
Potassium bichromate	lb.	0	0	7¾	to		—	
Carbonate, 90%	ton	31	0	0	to	33	0	0
Chloride 80%	ton	15	0	0	to	20	0	0
Chlorate	lb.	0	0	4½	to	0	0	5
Meta bisulphite, 50-52%	ton	112	0	0	to	120	0	0
Nitrate, refined	ton	45	0	0	to	47	0	0
Permanganate	lb.	0	0	9	to	0	0	10
Prussiate, red	lb.	0	2	4	to	0	2	6
Prussiate, yellow	lb.	0	1	2	to	0	1	2½
Sulphate, 90%	ton	20	0	0	to	22	0	0
Salammoniac, firsts	cwt.	3	5	0	to		—	
Seconds	cwt.	3	0	0	to		—	
Sodium acetate	ton	25	0	0	to	26	0	0
Arsenate, 45%	ton	45	0	0	to	48	0	0
Bicarbonate	ton	10	10	0	to	11	0	0
Bichromate	lb.	0	0	5¾	to		—	
Bisulphite, 60-62%	ton	25	0	0	to	27	10	0
Chlorate	lb.	0	0	3¾	to	0	0	4
Caustic, 70%	ton	24	0	0	to	24	10	0
Caustic, 76%	ton	25	10	0	to	26	0	0
Hydrosulphite, powder, 85%	lb.	0	2	3	to	0	2	6
Hyposulphite, commercial	ton	13	10	0	to	14	0	0
Nitrite, 96-98%	ton	37	10	0	to	40	0	0
Phosphate, crystal	ton	20	10	0	to	21	0	0
Sodium Perborate	lb.	0	1	2	to	0	1	3
Prussiate	lb.	0	0	9½	to	0	0	10
Sulphide, crystals	ton	13	0	0	to	14	0	0
Sulphide, solid, 60-62%	ton	24	10	0	to	25	0	0
Sulphite, cryst	ton	13	0	0	to	14	0	0
Strontium carbonate	ton	60	0	0	to	65	0	0
Strontium Nitrate	ton	60	0	0	to	62	10	0
Strontium Sulphate, white	ton	7	10	0	to	8	10	0
Sulphur chloride	ton	25	0	0	to	27	10	0
Sulphur, Flowers	ton	13	0	0	to	14	0	0
Roll	ton	13	0	0	to	14	0	0
Tartar emetic	lb.	0	1	6½	to	0	1	7
Tin perchloride, 33%	lb.	0	1	2	to	0	1	4
Perchloride, solid	lb.	0	1	5	to	0	1	7
Protochloride (tin crystals)	lb.	0	1	5	to	0	1	6
Zinc chloride, 102 Tw.	ton	21	0	0	to	22	10	0
Chloride, solid, 96-98%	ton	35	0	0	to	40	0	0
Oxide, 99%	ton	38	0	0	to	40	0	0
Dust, 90%	ton	47	10	0	to	50	0	0
Sulphate	ton	18	10	0	to	19	10	0

Coal Tar Intermediates, &c.

	Per	£	s.	d.		£	s.	d.
Alphanaphthol, crude	lb.	0	2	3	to	0	2	6
Alphanaphthol, refined	lb.	0	2	9	to	0	3	0
Alphanaphthylamine	lb.	0	2	0	to	0	2	3
Aniline oil, drums extra	lb.	0	1	0	to	0	1	1
Aniline salts	lb.	0	1	1	to	0	1	2
Anthracene, 40-50%	unit	0	0	8½	to	0	0	9
Benzaldehyde (free of chlorine)	lb.	0	3	9	to	0	4	3
Benzidine, base	lb.	0	5	9	to	0	6	0
Benzidine, sulphate	lb.	0	5	9	to	0	6	0
Benzoic acid	lb.	0	1	10	to	0	2	0
Benzoate of soda	lb.	0	1	9	to	0	1	11
Benzyl chloride, technical	lb.	0	2	0	to	0	2	3
Betanaphthol benzoate	lb.	0	4	9	to	0	5	0
Betanaphthol	lb.	0	1	9	to	0	2	0
Betanaphthylamine, technical	lb.	0	6	0	to	0	7	0
Croceine Acid, 100% basis	lb.	0	3	6	to	0	3	9
Dichlorbenzol	lb.	0	0	9	to	0	0	10
Diethylaniline	lb.	0	2	9	to	0	3	0
Dinitrobenzol	lb.	0	1	3	to	0	1	4
Dinitrochlorbenzol	lb.	0	0	10	to	0	1	0
Dinitronaphthaline	lb.	0	1	4	to	0	1	5
Dinitrotoluol	lb.	0	1	5	to	0	1	6
Dinitrophenol	lb.	0	2	9	to	0	3	0
Dimethylaniline	lb.	0	2	6	to	0	2	9
Diphenylamine	lb.	0	4	3	to	0	4	6
H-Acid	lb.	0	6	6	to	0	7	0
Metaphenylenediamine	lb.	0	5	6	to	0	5	9
Monochlorbenzol	lb.	0	0	10	to	0	1	0
Metanilic Acid	lb.	0	6	0	to	0	6	6
Monosulphonic Acid (2.7)	lb.	0	5	6	to	0	6	0
Naphthionic acid, crude	lb.	0	3	3	to	0	3	6
Naphthionate of Soda	lb.	0	3	3	to	0	3	6
Naphthylamin-di-sulphonic-acid	lb.	0	4	0	to	0	4	3
Nitronaphthalene	lb.	0	1	4	to	0	1	5
Nitrotoluol	lb.	0	1	0	to	0	1	2
Orthoamidophenol, base	lb.	0	10	0	to	0	10	5
Orthodichlorbenzol	lb.	0	1	0	to	0	1	1
Orthotoluidine	lb.	0	1	6	to	0	1	9
Orthonitrotoluol	lb.	0	0	10	to	0	1	0
Para-amidophenol, base	lb.	0	10	0	to	0	10	6
Para-amidophenol, hydrochlor	lb.	0	10	6	to	0	11	0
Paradichlorbenzol	lb.	0	0	6	to	0	0	7
Paranitraniline	lb.	0	3	6	to	0	3	9
Paranitrophenol	lb.	0	2	3	to	0	2	6
Paranitrotoluol	lb.	0	5	0	to	0	5	3
Paraphenylenediamine, distilled	lb.	0	11	0	to	0	11	6
Paratoluidine	lb.	0	7	0	to	0	7	6
Phthalic anhydride	lb.	0	2	9	to	0	3	0
Resorcin, technical	lb.	0	5	6	to	0	6	0
Resorcin, pure	lb.	0	7	0	to	0	7	3
Salol	lb.	0	2	3	to	0	2	6
Sulphanilic acid, crude	lb.	0	1	0	to	0	1	1
Tolidine, base	lb.	0	6	6	to	0	7	0
Tolidine, mixture	lb.	0	2	6	to	0	2	9

Potash

THE demand during the past week for Kainit 14 per cent. and Sylvinite 20 per cent. seems to indicate that buyers are now alive to the opportunities presented in the abnormally low prices at which these grades of potash can be purchased. The current quotations for parcels of ten or twenty tons of potash salts are even below the pre-war prices, for although the prices quoted for delivery to the farmer's station may be slightly higher, it must be borne in mind that the railway charges are at least 100 per cent. over the pre-war scale. Quotations for 2 to 4 ton lots f.o.r. London are now as follows:

Kainit 14 per cent. K_2O	£2 12 6	per ton
Sylvinite 20 per cent.	3 12 6	,, ,,
,, 30 per cent.	5 12 6	,, ,,
Muriate of Potash 50 per cent.	10 10 –	,, ,,
Sulphate of Potash 90 per cent purity	14 10 –	,, ,,

Reports concerning developments in the Alsatian Potash industry go to show that the manufacture of sulphate of potash is to be carried out on a more extensive scale than hitherto in France. Factories have been established in various centres in France and in Belgium with the object of supplying sulphate of potash for overseas markets.

Scottish Chemical Market

The following notes on the Scottish Chemical Market are specially supplied to THE CHEMICAL AGE *by Messrs. Charles Tennant and Co., Ltd., Glasgow, and may be accepted as representing the firm's independent and impartial opinions.*

GLASGOW, FEBRUARY 8, 1922.

WHILST the general trend of business is towards improvement, the movement is slow.

Prices remain nominally firm, but buyers with orders to place have the pull of the market.

During the past week orders have been small, consumers continuing to buy from hand to mouth. Deliveries under consumpt contracts continue to disappoint earlier hopes.

Alkali products are in no great demand and prices are unchanged, although some cheap lots of caustic soda have been heard of.

The output of sulphuric acid and marine acid continues low and export business for these acids is impossible at makers' present prices.

The referee's decision on the Carbide of Calcium case is understood to have gone against the complainants and this product continues as a free import.

Benzol is offered from the States below home prices.

Industrial Chemicals

ACETONE.—The higher prices have brought out a few more offers, especially from the States. Price £75 per ton, drums included.

ACID ACETIC.—Inquiries rather fallen off, but prices fairly steady. GLACIAL B.P.—£55 per ton. Continent offering glacial at £45 per ton, c.i.f., in limited quantity, but delivery indefinite. 33 PER CENT. B.P. in carboys, £28 10s. spot lots.

ACID MURIATIC, 28/32 PER CENT.—6/9d. to 7/3d. per carboy ex works. Little demand, consumers holding off for lower prices

ACID OXALIC.—8d. per lb. Some cheaper continental prices, but deliveries not coming forward.

ACID SULPHURIC.—Pyrites: 168°, tanks £6 16s., carboys £7 15s; 144°, tanks £3 11s., carboys £4 10s. Pure Ffa: 168°, tanks £7 16s., carboys £8 15s.; 144°, tanks £4 16s., carboys £5 15s. Ex works.

ALUM, POTASH.—Lump £15. Little request.

AMMONIA CARBONATE.—No change in prices. Orders light. Liquid ·880 in drums at 4½d. per lb.

AMMONIA, GALVANISERS' MURIATE.—£34 10s. f.o.r. Glasgow.

ARSENIC, CORNISH WHITE POWDERED.—Firm at £39 to £40 ex works in usual casks, but few inquiries.

BARYTES.—Home prices unchanged. Grey £4. White £6. Continent quoting rather dearer this week and delivery doubtful.

CALCIUM CARBIDE.—Prices unchanged, at £20. Continental offers scarce.

CALCIUM CHLORIDE.—£7 10s. solid, in drums. Little business passing.

COPPER SULPHATE, 99 PER CENT.—Price firm at about £28 10s. f.o.b., but few inquiries for consumpt in Scotland.

GLAUBER SALTS.—£5 ex store, in bags. Trifling business on spot.

MAGNESIUM CHLORIDE.—Spot lots £8 10s. ex store. C.i.f. quotations from Continent easier, but delivery uncertain.

POTASSIUM CARBONATE, 90/92 PER CENT.—Rather easier at about £28 10s. ex store, but few inquiries.

POTASSIUM CAUSTIC, 88/92 PER CENT.—Spot lots £34 10s. ex station. In slight request.

POTASSIUM CHLORATE.—5d. per lb. f.o.r., but no inquiry.

POTASSIUM NITRATE.—£35 per ton ex store. Steady inquiry for small spot parcels.

SALTCAKE, 95 PER CENT.—Market is weaker and buyers with firm orders to place could probably close around £3 10s. to £4 per ton in bulk, f.o.b. British port.

SODIUM BICARBONATE.—No change. £11 10s. per ton in bags, ex quay.

SODIUM CARBONATE (Alkali 58 per cent.).—No change. £9 15s. ex quay.

SODIUM CARBONATE (Soda Crystals).—£6 10s. per ton ex quay.

SODIUM CAUSTIC.—Solid, 76/77 per cent., £25 10s.; 70/72 per cent., £23 10s., ex station. 98 per cent. POWDERED and FLAKE, £28 15s. to £29 5s. ex station.

SODIUM METALLIC.—Some business has been placed for Continental make at 9½d. per lb. c.i.f. U.K. port.

SODIUM NITRATE.—£13 17s. 6d. f.o.b. Quiet market.

SODIUM NITRATE, 100 PER CENT.—£32, f.o.r. No change and few inquiries.

SODIUM SILICATE, 140°.—£12 to £12 10s. per ton.

SODIUM SULPHIDE CRYSTALS, 30/32 PER CENT.—Market weak at £11 17s. 6d. per ton.

SODIUM SULPHIDE, 60/62 PER CENT. CONC.—In drums, £22, ex station.

SULPHUR.—Flowers, £14; Ground Floristella, £12 10s.; Refined Rock, £13; Roll, £13 ex store. Prices nominal. Very little business passing. Government surplus stocks of Sicilian Thirds still to be had at attractive prices.

WAXES.—S. R. 118/120°.—2½d. per lb. delivered. WHITE SCALE, 122/124°.—£14 c.i.f. February shipment. Some Government surplus 140° at cheap prices still available.

Coal Tar Intermediates and Wood Distillation Products

ALPHA NAPHTHOL.—Small inquiries on the market and prices quoted around 2s. 9d. per lb.

BETA NAPHTHOL.—Home make offering at lower prices. Around 1/6d. per lb. f.o.r. makers' works.

BENZOL.—Some orders have been placed for 90°, with the U.S.A., around 2s. 6d. per gallon c.i.f. U.K. port, drums included.

BENZIDINE BASE.—A few small inquiries on the market at limits below prices asked. Price 6s. per lb.

"H" ACID.—Small inquiry with a few sales at 7s. per lb.

METHYL ALCOHOL continues to be freely offered around £65 per ton c.i.f. U.K. port.

METANILLIC ACID.—Small inquiry. Price 2s. 6d. per lb. 100 per cent. basis.

PARANITRANILINE.—Rather more inquiry, especially for export. Price 3s. 9d. to 3s. 10d. per lb. f.o.b. U.K. port.

German Chemical Exports in 1921

FROM A CORRESPONDENT.

ACCORDING to the published statistics relating to Germany's export trade in 1921, there was a sharp decline with respect to chemicals, drugs, and dyes. In spite of advanced prices, a marked decline in production is apparent in the chemical industry, which in 1920 ranked second on the export list. Throughout the year until November exports were small, as America, England, and Italy were not buying in large quantities. Anti-dumping measures and import duties in Spain, France, and South America were additional factors in the restriction of German trade overseas. The quantity of aniline colours exported dropped to 30 per cent. of the 1913 figures, and shipments of alizarine and alizarine colours were 18 per cent. of the 1913 quantities and 60 per cent. of the 1920 quantities. Indigo exports were only 20 per cent. of the 1913 total. Exports of potassium and other salts, which rose by 200,000 tons in 1920, have gone down some 440,000 tons. In ammonium-sulphate 1920 saw a reduction of 30 per cent. as compared with 1913 quantities, while in 1921 exports were smaller by 10,000 tons. According to statistics recently published by the Ammoniak-Werkaufsvereinigung, the total German production of ammonium-sulphate during 1921 amounted to about 510,000 tons. The total of the chief chemical products exported in 1913 was 536.2 millions of gold marks; the 1920 total was 995 millions, and in view of changed values, the 1921 total will probably be in the vicinity of 52.6 millions.

Recent Wills

Sir George John Smith, of Treliske, Truro, Cornwall, chairman of Bickford, Smith, & Co., and deputy chairman of Nobel Industries, Ltd.....	£97,023
Mr. Luke Crabtree, of Lea Grange, Blackley, Manchester, managing director of J. & J. Thompson & Co., Ltd., wholesale chemists, 192, Manchester Street, Oldham.....	£24,050
Sir German Sims Woodhead, K.B.E., inventor of the chlorination process for purifying water ..	£6,579
Mr. Benjamin Havard, of Cross House, Newport, Pembrokeshire, chemist	£2,928

Manchester Chemical Market

Monthly Report by Sir S. W. Royse and Co., Ltd.

DURING January there has been a somewhat better inquiry, chiefly for the home trade, and a fair amount of business has been put through. Prices on the whole have shown little variation, but transactions continue to be mostly for near delivery. Sulphate of copper has been in good request for export and price has ruled firm; notwithstanding the weakness of the metal, home trade requirements have been only moderate. Copperas has been little called for and stocks have been accumulating. Grey acetate of lime has been in short supply and is dearer, whilst acetic acid has been realising better values. Acetate of soda has been in steady demand, but acetates of lead and nitrate of lead have been only in limited request. Carbonate of potash has been in fair demand at unchanged prices. Caustic potash has hardened somewhat in value. Sulphate of potash is short on spot with a moderate inquiry. Montreal potashes have been offering freely. Yellow prussiate of potash has been well called for and stocks are firmly held. There is a scarcity in prussiate of soda and makers are heavily sold for delivery well ahead; the demand continues active and price is very firm. White powdered arsenic has only been moving in small lots. A fair business has been passing in tartaric acid, but consumers are hesitating about covering themselves far ahead. Cream of tartar has been in steady request at lower prices and citric acid also has been rather pressed for sale. Tartar emetic continues firm. During the month, prices of bichromates have been reduced and a good export trade in potash has been put through; the works are well stocked in soda. Oxalic acid has been quiet. Makers of borax and boracic acid have been well supplied with orders, but there is keen competition in phosphate of soda. The call for alum and sulphate of alumina has been only moderate. Muriate of ammonia and sal-ammoniac have been pressed for sale, but values are unchanged. Bleaching powder has been in steady request for the home trade and there has been an increased demand for both ammonia alkali and caustic soda for export. Superphosphate is in good request. There is very little change to report in tar products, the inquiry having been mostly for prompt requirements and little interest shown in forward business. Benzols and toluols are in demand and supplies are short, but prices are unchanged. Solvent naphtha, if anything, is somewhat easier, consumers buying merely from hand to mouth. There is no material change in creosote and little business is being done, consumers anticipating still lower figures. Crude carbolic acid has been in somewhat better inquiry, but values are not yet sufficiently interesting to stimulate production. Naphthalene shows little improvement. More activity has been displayed in the pitch market during the last few days and prices have consequently become firmer. The demand is, however, mainly for prompt and early shipment, consumers being very cautious in regard to forward supplies. There is nothing new to report in sulphate of ammonia and prices remain unaltered.

German Chemical Trade Notes

FROM OUR OWN CORRESPONDENT.

Berlin, February 6, 1922.

SOME improvement in domestic sales has been apparent in the potash industry owing to an improvement in the railway situation. According to recent statements, the funds invested in this industry are estimated to average two thousand million gold marks. Stocks of potash ferti'isers are scarce at present. There are still a number of old orders from abroad to be fulfilled. Domestic trade in by-products has been moving along active lines. The price convention for rock salts, established in December last, has proved advantageous and fair orders have been placed in spite of advanced prices.

No real change is reported on the domestic market for dyestuffs, while export trade, which was mainly with the Austro-Hungarian states, Holland, Belgium, Scandinavia, and Portugal, has declined.

Returns in pharmaceutical products both for inland and export were satisfactory. The demand for industrial chemicals (mainly heavy) has declined. Alkalis have been moving along routine lines. Export trade to France has been practically prevented by high Customs charges; trade with Holland and Belgium is suffering from the economic situations in these countries; sales to the U.K., however, have been fairly satisfactory. There is some reason to anticipate an improvement in exports to Russia, but up to now practically no business has been done. During the past week the general tone of the chemical market has been decidedly firm, though repeated attempts to move large lots have failed.

The market for nitrogen fertilisers during January was influenced by the London "pool" which, though holding its selling prices high, met with strong competition. Demand is strong and well maintained. During the coming months ample quantities of sulphate of ammonia will be available, but lime-nitrogen will probably be scarce owing to a deficiency in upper Silesian production. According to recent advices a new advance of prices for nitrogen fertilisers is expected shortly, owing to higher railway rates and coal prices.

Sir John Cass Institute Prize-giving

THE annual distribution of prizes to students of the Sir John Cass Technical Institute, Jewry Street, Aldgate, London, took place on Wednesday, the Rev. J. F. Marr, Chairman of the Governing Body, presiding. The Chairman, in his introductory speech, referred to the great increase in the number of students of chemistry. One of their most successful recent developments was, he said, the Department of Petroleum Technology, in the development of which Sir Frederick Black had played so prominent a part. In the realm of glass technology they had been able to add the names of Professor Morris Travers and Professor W. E. S. Turner as lecturers. Mr. Cook, the Institute's lecturer in inorganic chemistry, had been awarded the degree of M.Sc. London. Referring in felicitous terms to the work of Dr. C. A. Keane, the chairman pointed out that he had carried out the duties of Principal during the last twenty years.

Professor Rothenstein then presented prizes as follows: Best student in attendance at each course (from the matriculation to Second Year Final B.Sc.)—G. E. Thompson, F. Turner, A. E. Chattin, V. C. W. Brown, N. G. Sparkes, G. H. Fuidge, C. E. Carey. Prizes presented by the directors of the South Metropolitan Gas Co., on the results of the work done by students in their employ during the session: Junior Science Students—E. R. Ward. Degree Students—C. E. Carey, G. H. Fuidge, L. W. Townsend. Department of Physics and Mathematics: Special prize for research work—E. J. Evans. Department of Chemistry: Award of certificate—Miss E. H. Pawsey; Prizes—First year, A. G. Garnham; second year, A. C. Webster; third year, J. W. Jack; fourth year, Division I., C. S. Harman; Division II., G. W. Bender. Special prize for research work—D. G. Murdoch. Department of Metallurgy: Award of certificates—R. E. C. Hudson, A. Kloetzli, E. F. Waterhouse.

Aniline Dye and Chemical Co.'s Guarantors

IN the King's Bench Division on Monday Mr. Justice Acton decided an action in which the London Joint City and Midland Bank sued Mr. Charles William Massey, Mr. Walter Massey, and Mr. James Gibson, of Stretford Road, Manchester, to recover upon a guarantee of December 12, 1918, by which defendants guaranteed the account of the Aniline Dye and Chemical Co. to the bank, the liability of each not to exceed £5,000. There was also a second action by which Mr. Gibson was sued on an additional guarantee for £10,000. The company, it was stated, had operated in the Midlands and the North, and had gone into liquidation, and the bank had secured judgment for some £27,000. The defence set up by Mr. Gibson—who was the only defendant to contest the matter—was that in October, 1920, the bank took in substitution of the two guarantees a guarantee for £25,000 signed by Mr. Gibson, the late Lord Shrewsbury, and Sir Henry Busby Bird, when the two latter became directors in the place of Messrs. Massey. After hearing the evidence his Lordship decided that the final guarantee was additional to, and not in substitution of, the previous documents, and judgment was given in the first action against each of the three defendants for £5,000, and in the second against Mr. Gibson for £10,000.

Death of Mr. H. L. Allen

WE regret to record the death on January 31, at Saranac Lake, New York, of Mr. Harry Leonard Allen, B.Sc., F.I.C. younger son of Mr. C. B. Allen, of 7. Linden Avenue, Newport, Fifeshire. He had been a member of the Society of Chemical Industry since 1911.

Company News

BROKEN HILL PROPRIETARY, BLOCK 14.—The total working loss for the half year to September 30 last was £7,840. The balance at credit of the profit and loss account is £22,194.

BROKEN HILL PROPRIETARY, BLOCK 10.—The total working loss for the half year to September 30 last was £8,297. The balance at credit of the profit and loss account, after deducting a net loss of £2,300, is £41,156.

DOMINION GLASS CO.—The profit for the year to September 30 last was $699,599. After meeting bond interest and preferred dividend, and paying dividends amounting to 6 per cent. on common stock, there remained $92,599, increasing the credit balance to $818,142.

SOCIÉTÉ FRANCAISE DE PÉTROLE, LTD.—The secretary states that an option on the company's properties in West Africa has been granted to a powerful group, on terms closely approximating those contained in the agreement with the d'Arcy Exploration Co., Ltd., particulars of which were communicated to the shareholders in July, 1918.

LEVER BROTHERS, LTD.—Dealings in 1,976,304 twenty per cent. cumulative preferred ordinary shares of 5s. each, fully paid, Nos. 3,889,181 to 5,865,484 have been specially allowed by the Stock Exchange Committee under Rule 148A. These securities will rank *pari passu* with those in which special settling days have already been appointed as soon as they are identical and the certificates are ready for distribution, and with those for which an official quotation has already been granted as soon as they are identical and are officially quoted.

SOUTH STAFFORDSHIRE MOND GAS.—The directors, in submitting the accounts for the year 1921, regret that there is a serious loss on the year's working, and that the payment of the dividend on the preference shares will have to be deferred. The capital expenditure for the year was £1,074. The loss on revenue account was £22,743. Adding to this £9,186 for debenture and other interest, the total loss amounts to £31,929. Deducting this sum from £35,471, the balance brought forward in the profit and loss account, £3,542, remains to be carried forward. The ordinary general meeting will be held at Dudley Port, Tipton, on February 28, at 2.45 p.m.

ALLEN-LIVERSIDGE, LTD.—Speaking at the annual meeting on Tuesday, Mr. C. S. Gilman said that in the circumstances shareholders would probably be gratified that the reduction in the dividend was not greater than from 12½ per cent. to 10 per cent., especially as the payment of that demanded £3,000 more than was distributed a year ago, while they were carrying forward a larger sum than that brought in, and were writing off sundry expenses amounting to £4,092. The amalgamation of the Dissolved Acetylene Co. and the Imperial Light, Ltd., with their company was only completed on October 22, 1920. The result of the issue of ordinary shares which he had foreshadowed at the last meeting had been disappointing, although it had been made pursuant to the best opinion of the City.

ANGLO-PERSIAN OIL CO., LTD.—In an announcement with respect to the recent issue, the directors state that letters of allotment and regret were posted on Wednesday. The final figures show that the total number of applications was over 63,000 and the total amount applied for over £63,000,000, against £4,050,000 offered. No allotment has been made to public applicants in respect of the preference shares for under 200 shares, or to Anglo-Persian and Burmah shareholders under 150 shares. Allotments to the public average 8 per cent., and to shareholders 10 per cent., with preference to the smaller applicants. In respect of the ordinary shares, no allotment has been made to applicants for under 100 shares. Allotments to the public average 4 per cent., and to shareholders rather less than 6 per cent., with preference to the smaller applicants.

PAN DE AZUCAR NITRATE CO.—The gross profit for the year to June 30 last, inclusive of transfer fees, amounted to £48,367. After deducting London expenses, £2,351; reserve for income tax and corporation profits tax, £15,150; exhaustion of raw material and depreciation of plant, £6,844; interest and discount, £1,220; insurance reserve, £300; the net profit amounts to £22,502, and £21,136 was brought in, leaving an available balance of £43,638. In view of the temporary stagnation of the nitrate industry, the directors consider it advisable to adopt a conservative financial policy. They recommend the payment of a dividend of 15 per cent., less tax, absorbing £11,550, leaving £32,088 to be carried forward. The average price obtained was 16s. 0½d. per quintal. There was a stock of 313,877 quintals of manufactured nitrate at the oficina at June 30, 1921, valued at cost (£78,441); 110,000 quintals of this stock has since been shipped and paid for at the price of 16s. per quintal, and the profit thereon will be credited in the next account. The balance of 203,877 quintals has not yet been sold. The meeting will be held at Winchester House, London, on February 13 at noon.

Chemical Trade Inquiries

The following inquiries, abstracted from the "Board of Trade Journal," have been received at the Department of Overseas Trade (Development and Intelligence), 35, Old Queen Street, London, S.W.1. British firms may obtain the names and addresses of the inquirers by applying to the Department (quoting the reference number and country), except where otherwise stated.

LOCALITY OF FIRM OR AGENT.	MATERIALS.	REF. No.
Cairo ..	Sal ammoniac, bichromate, potash, shellac, &c.	129
Turin ..	Pulp, Soya Beans, oils, greases, tallows and chemical products	140
Chicago ..	Vegetable oils	152
Brazil ..	Heavy and industrial chemicals ..	153
Melbourne ..	Heavy chemicals	156
Belgrade ..	Petroleum	D. O. T. 7,283 F.E/P.N.

Tariff Changes

AUSTRALIA.—The functions of the Tariff Board provided for by the Tariff Board Act, 1921, are published in the Board of Trade *Journal* (February 2, p. 137).

FIJI.—The text of a new form of certificate of origin for preferential goods was published in the Board of Trade *Journal* (February 2, p. 137).

LEEWARD ISLES.—A revised form of certificate of origin for goods grown, produced, or manufactured in the British Empire was published in the Board of Trade *Journal* (February 2, p. 137).

NORTHERN RHODESIA.—New regulations relating to the framing of Bills of Entry are now in force.

ST. CHRISTOPHER AND NEVIS.—The present British Preferential Tariff rate on butter substitutes, including butterine and oleo-margarine, is 7s. per 100 lb., as against 6s. The General Tariff rate remains at 10s. 6d.

FINLAND.—A new Customs Tariff, with few exceptions, provides for increased Customs duties on all goods imported into Finland, in some cases to the extent of 300 per cent.

ITALY.—Residues from asbestos "platinato," and linseed oil (boiled) may be exported without the requirement of an export licence.

POLAND.—Recent amendments to the Customs regulations may be seen at the Tariff Section of the Department of Overseas Trade, 35, Old Queen Street, London.

SPAIN.—The rate of surcharge for the month of February in respect of import and export duties, Customs fines, &c., has been fixed at 28-55 per cent., as against 33-52 per cent. in January.

Restrictions on the Sale of Explosives

AN Order in Council published in the *London Gazette* on Tuesday puts restrictions, as from February 6, on the sale of certain kinds of explosives. It does not apply to gunpowder and many ordinarily used explosives. No person is to sell any explosives to which the Order applies unless he has satisfied himself that the buyer has a police certificate as provided by Orders in Council, the two Orders in Council of April 20, 1883, or the Order in Council of October 26, 1896. (This provision does not apply to mine or quarry owners or managers selling explosives to employees.) Any person selling explosives covered by the Order must also enter all sales in a register to show to Government or local officials when required. The Order applies to all explosives except the following:—Gunpowder, small-arm nitro-compound, safety cartridges made with gunpowder or with small-arm nitro-compound, cartridges or charges for cannon or blasting made with gunpowder and not containing within themselves their own means of ignition, percussion caps, safety fuse, or fireworks.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for any errors that may occur.

London Gazette

Partnerships Dissolved

OWEN, William, and WHATMOUGH, Wilfred Ambrose, manufacturing chemists, 457, Caledonian Road, Holloway, and 108, Packington Street, Islington, London, under the style of JOHN TYE & SON, by mutual consent as from September 30, 1921. Debts received or paid by W. Owen, who will continue the business.

SIMNETT, Roland Edgell, and SIMNETT, Spencer Riley, chemists, 60, High Street, Beckenham, Kent, under the style of SIMNETT BROS., by mutual consent as from November 12, 1921. Debts received and paid by S. R. Simnett, who will continue the business.

SIMPSON, Bertie Leon, and WELLENSTEIN, Mathias Marcel, chemists' sundriesmen, &c., 118 to 122, Holborn, London, under the style of T. HAYDEN & CO., by mutual consent as from December 10, 1921. Debts received and paid by M. M. Wellenstein, who will continue the business.

Bankruptcy Information

ASCOTT'S DRUG STORES, 13, Prince of Wales Road, Kentish Town, London, chemists. Receiving order, January 31. Creditor's petition. First meeting, February 14, 12 noon, and public examination, April 5, 11 a.m. Bankruptcy Buildings, Carey Street, London, W.C. 2.

Company Winding Up Voluntarily

CARBIDE CORPORATION, LTD. D. Martin-Watt, Capel House, 54, New Broad Street, London, E.C. 2., appointed liquidator. Meeting of creditors at liquidator's office, Friday, February 17, at 3 p.m.

Edinburgh Gazette

STEVENSON, Archibald Stewart, lately manufacturing chemist, and now 86, Eveline Street, Dennistoun, Glasgow. Estates sequestrated February 3, 1922. Meeting to elect trustee and commissioners on Friday, February 17, Faculty Hall, St. George's Place, Glasgow, at 12 noon.

County Court Judgments

[*NOTE.—The publication of extracts from the "Registry of County Court Judgments" does not imply inability to pay on the part of the persons named. Many of the judgments may have been settled between the parties or paid. Registered judgments are not necessarily for debts. They may be for damages or otherwise, and the result of bona-fide contested actions. But the Registry makes no distinction of the cases. Judgments are not returned to the Registry if satisfied in the Court books within twenty-one days. When a debtor has made arrangements with his creditors we do not report subsequent County Court judgments against him.*]

BILLING, CHAS. & CO., 4, Buckingham Road, Wealdstone, manufacturing chemists. £12 10s. 6d. November 28 and £11 14s. November 29.

CARRUTHERS, W. T. (and wife), Glencaple, Gloddaeth Crescent, Llandudno, chemist. £14 19s. 8d. November 10.

NOBLE, Desmond W., 2, Wells Street, E., chemist. £41 16s. 6d. November 17.

Mortgages and Charges

[*NOTE.—The Companies Consolidation Act, of 1908, provides that every Mortgage or Charge, as described therein, created after July 1, 1908, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every Company shall, in making its Annual Summary, specify the total amount of debts due from the Company in respect of all Mortgages or Charges which would, if created after July 1, 1908, require registration. The following Mortgages and Charges have been so registered. In each case the total debt, as specified, in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced since such date.*]

CARLTON LAUNDRY AND DYEWORKS, LTD., Carlton (Notts.).—Registered January 30, £2,000 and bonus of 10 per cent. debentures; general charge. *——. December 31, 1920.

HARKER (C. R.) STAGG & MORGAN, LTD., London, E., wholesale druggists.—Registered January 25, charge to National Bank, Ltd., securing all moneys due or to become due to the Bank; charged on 185, Skidmore Street, and ground in rear of 20 to 30, Canal Road, Mile End. *£5,350, December 27, 1921.

PICKLES AYLAND & CO., LTD., Ossett, chemists.—Registered January 30 (by order on terms), charge dated November 28, 1921, to National Provincial and Union Bank of England, Ltd., securing all moneys due or to become due to the Bank; charged on land and buildings at Ossett. *To secure Bank overdraft no amount stated, approximate amount £1,100. December 12, 1921.

Receivership

ABDUL ISHMAL HAMIRD & CO., LTD. J. Baker, F.C.A., Eldon Street House, Eldon Street, E.C. 3, ceased to act as receiver on January 23, 1922.

New Companies Registered

AMMONIA SOFT SOAP CO., LTD., 106, Bridge Road, Leicester. Manufacturers of and dealers in ammonia, soft soap and soaps, detergents and cleansing preparations of all kinds, &c. Capital, £300 in £1 shares.

COLLIERY EXPLOSIVES CO., LTD., 119, Market Street, Earlestown, Lancs. To acquire and turn to account any inventions for improved explosive compounds and processes for moulding cartridges and apparatus therefor, and for protecting, preserving or packing explosives, &c., and to carry on the business of manufacturers of explosives, electric fuses and detonators, &c. Capital, £6,000 in £1 shares.

COMMERCIAL AND CHEMICAL SUPPLIES, LTD., 23A, Mount Stuart Square, Cardiff. Manufacturers of and dealers in carbolic, creosotic and other disinfecting, deodorising and scouring fluids, powders, compounds, soaps, &c. Capital, £1,000 in £1 shares.

MURGATROYD'S SALT WORKS, LTD. To take over the business of salt proprietors and manufacturers carried on by Murgatroyd's Salt Works Co. at Middlewich, and to adopt an agreement with Herbert Levinstein. Nominal capital, £15,000 in £1 shares. A director: Herbert Levinstein, D.Sc., Ford Bank, Didsbury (director British Dyestuffs Corporation, Ltd.), chairman.

PARR'S DYE AND CHEMICAL CO., LTD., 62, Queen Street, Hulme, Manchester. To acquire the business carried on by W. Pimlott and P. Andrews, as the "Consol Dye and Chemical Co." Capital, £3,000 in £1 shares.

SEPTIMUS RIVETT, LTD., Eastfield Road, Wollaston, Northants. Manufacturers of and dealers in all kinds of waterproof appliances, cements, oils, paints and solutions for waterproofing or other similar purposes, &c. Capital, £10,000 in £1 shares (3,000 7 per cent. cumulative preference).

THE ASIATIC PETROLEUM CO. (PALESTINE), LTD., St. Helens Court, Great St. Helens, London, E.C. Producers, refiners, storers, transporters, suppliers and distributors, consignees and agents for the sale of petroleum and other oils and products thereof, &c. Nominal capital, £10,000 in £10 shares.

Fuerst Brothers, Ltd.

THE statutory meeting of creditors of Fuerst Brothers, Ltd., chemical merchants (in voluntary liquidation), was held in London on Monday, at the office of the liquidator. The proceedings were private.

Chemical Trade Wages: Situation Unchanged

ON Thursday Mr. Kelly, who is acting as spokesman on behalf of the unions concerned in the employers' proposal to reduce wages in the chemical trade, informed a representative of THE CHEMICAL AGE that most of the workers had held meetings further to discuss the proposals, but he had not yet been advised of the final decision of the combined unions. The men felt, he said, that any further reduction of wages would be most undesirable, but that such a large reduction as 3d. per hour would be positively unjust. The employers had been approached with a view to ascertaining whether they would consider a modification of the present proposal, but their attitude, said Mr. Kelly, had been uncompromising.

TRADE GUIDE

CHEMICAL AGE

THE Trade Guide is a compact and handy form of reference to a representative list of firms engaged in various branches of the Industry. In most cases fuller particulars may be found by referring to the displayed advertisement elsewhere.

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SULPHURIC
MURIATIC
DIPPING
BATTERY
NITRIC

OLEUM
(al Strengths)
and
SALTCAKE

SPENCER CHAPMAN & MESSEL, Ltd.
36, Mark Lane, E.C.3.

Acid Resisting Metals

MONEL

Succeeds where other Metals fail.
Acid-resisting-Incorrodible
Bars, Rods, Sheets, Wire
Castings, Forgings

G. & J. WEIR LTD MONEL DEPT. CATHCART, GLASGOW.

Analytical Reagents

THE BRITISH DRUG HOUSES LIMITED — BDH — LONDON

Research Chemicals
THE BRITISH DRUG HOUSES, LTD.,
Graham St., City Rd.,
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Asbestos

Pioneers of the World's Asbestos Industry

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(Established 1871)

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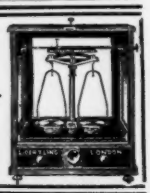

Chemical Plant

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Centrifuges
Autoclaves
Sterilizers, etc.
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Steam, Belt, Electrical, and Water Driven.
For every class of separation.
Write for new Catalogue No. 30.
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THE decolourising carbon and Refining Agent.
30 Times adsorptive capacity of bone char.
In five grades.
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OXIDES CHROME COBALT
CADMIUM SULPHIDE,
SELENIUM.
ETC., ETC.
for POTTERY, GLASS, ENAMELLED IRON, AND CEMENT.
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Removes Objectionable Smells in White Spirit, Turpentine Substitutes, Lubricating and Fuel Oils, Greases, Distempers, Glues, Etc.
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TINS for
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MAKERS OF ALL TYPES OF CHEMICAL PLANT.

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